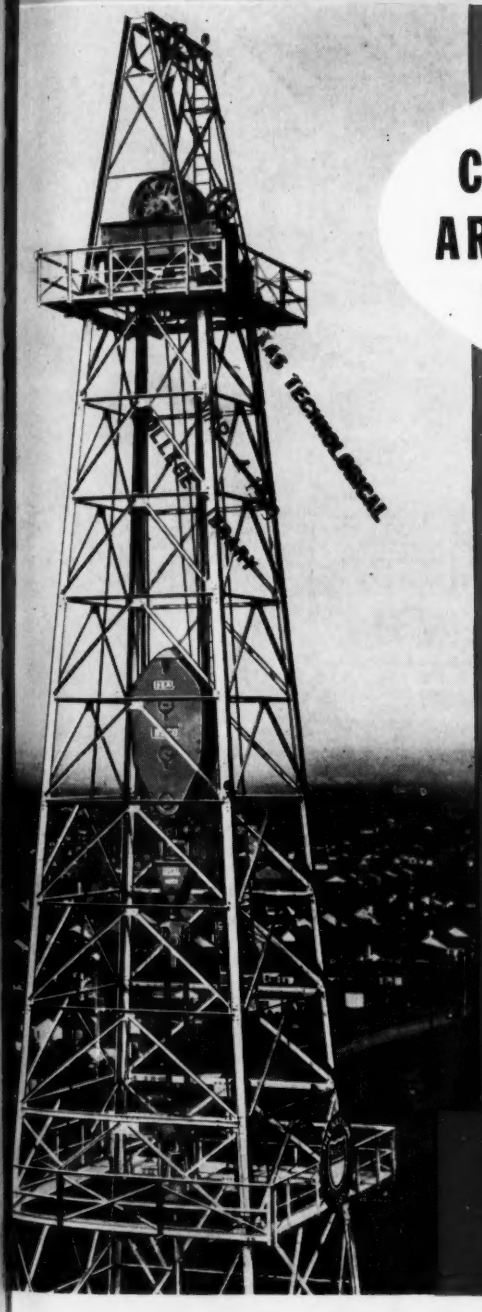
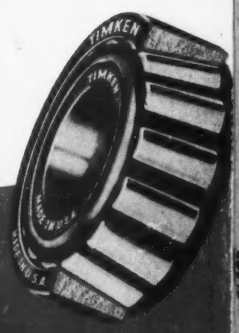
the OIL AND GAS JOURNAL

WORLD'S LARGEST CROWN AND TRAVELING BLOCKS ARE EQUIPPED WITH TIMKEN® BEARINGS




Designed and built to handle 540 ton maximum loads at 20,000 feet, the Ideal Type 760-T crown block and Ideal Type 660-TD traveling block are the largest of their kind in the world according to the records of the manufacturer, The National Supply Company.

The crown block is rated at 630 tons suspended load and the traveling block at 540 tons suspended load. Both use 60" sheaves, 7 in the crown block and 6 in the traveling block. All sheaves are individually mounted on double row, heavy duty Timken bearings.

These blocks are part of the National Supply Company's latest hoisting equipment for 20,000 ft. drilling, exhibited for the first time at the 1948 International Petroleum Exposition.

National Supply knows from long experience that Timken tapered roller bearings can be depended upon for smooth, friction-free operation, with minimum operating and maintenance attention under maximum loads within their rated capacity — radial loads, thrust loads or both together in any combination. Hence they selected Timken bearings for these big blocks with full confidence in their ability to stand up under the severe service to which they would be subjected. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".

Photograph made at 1948 International Petroleum Exposition and shown here through the courtesy of The National Supply Company.

TIMKEN
TAPERED ROLLER BEARINGS

A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⊕ AND THRUST →⊕← LOADS OR ANY COMBINATION →⊕←


PRICE 50 CENTS

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MARCH 3, 1949

XUM

# MAGIC FINGERS

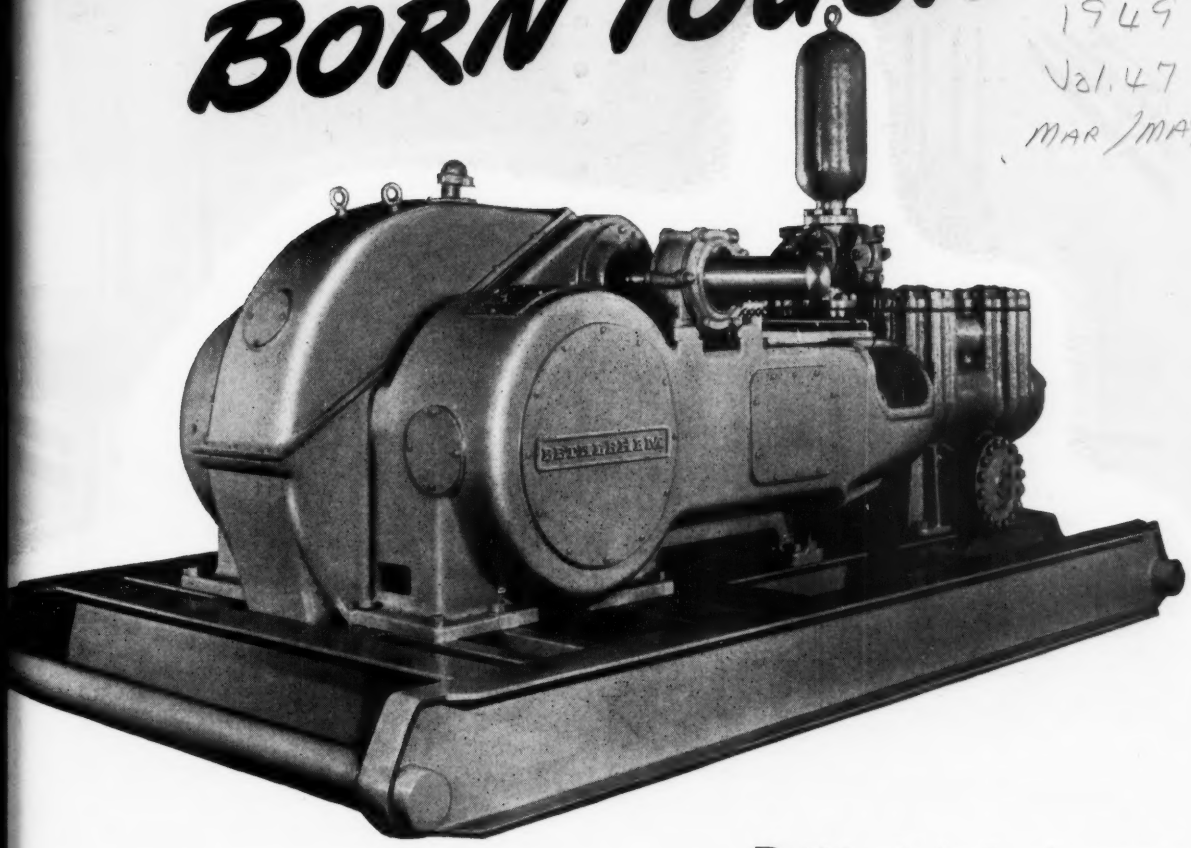
Magic is the word for the Howco caliper . . . Unerringly its sensitive "fingers" probe the side of a bare hole, note every characteristic and record their findings on camera film . . . Applications include: drilling mud and time studies, location of packer seats and sidewall coring points . . . accurate volume calculations for fill-up of cement, plastic or gravel packing jobs . . . lost circulation, fishing jobs, etc., etc. Technical papers on its uses are available on request.

**HALLIBURTON OIL WELL CEMENTING CO.**

DUNCAN, OKLAHOMA

# BORN BIG... BORN TOUGH

TN
860
O 4
1949
Vol. 47
MAR/MAY



**Bethlehem's family of pumps has a husky new arrival.**

**It's the G-450, and it bears a strong resemblance to its powerful, time-tested older brother, the G-600. Not as large, of course, but its features are the same and it's a rough, tough slugger.**

**The 450 has the starch and stamina for deep-hole drilling. Simply hook it up, turn on the power, and whop!—it's in there punching for you!**

## *8 reasons why the G-450 is a winner*

- Tri-phase lubrication
- Overhanging crank construction
- Steel fluid end
- Heavy, rigid cast power frame
- Flint-hard liners
- 100% roller-bearing construction
- Removable crosshead slides and guides
- Built-in tell-tale holes

BETHLEHEM STEEL

**BETHLEHEM SUPPLY COMPANY**

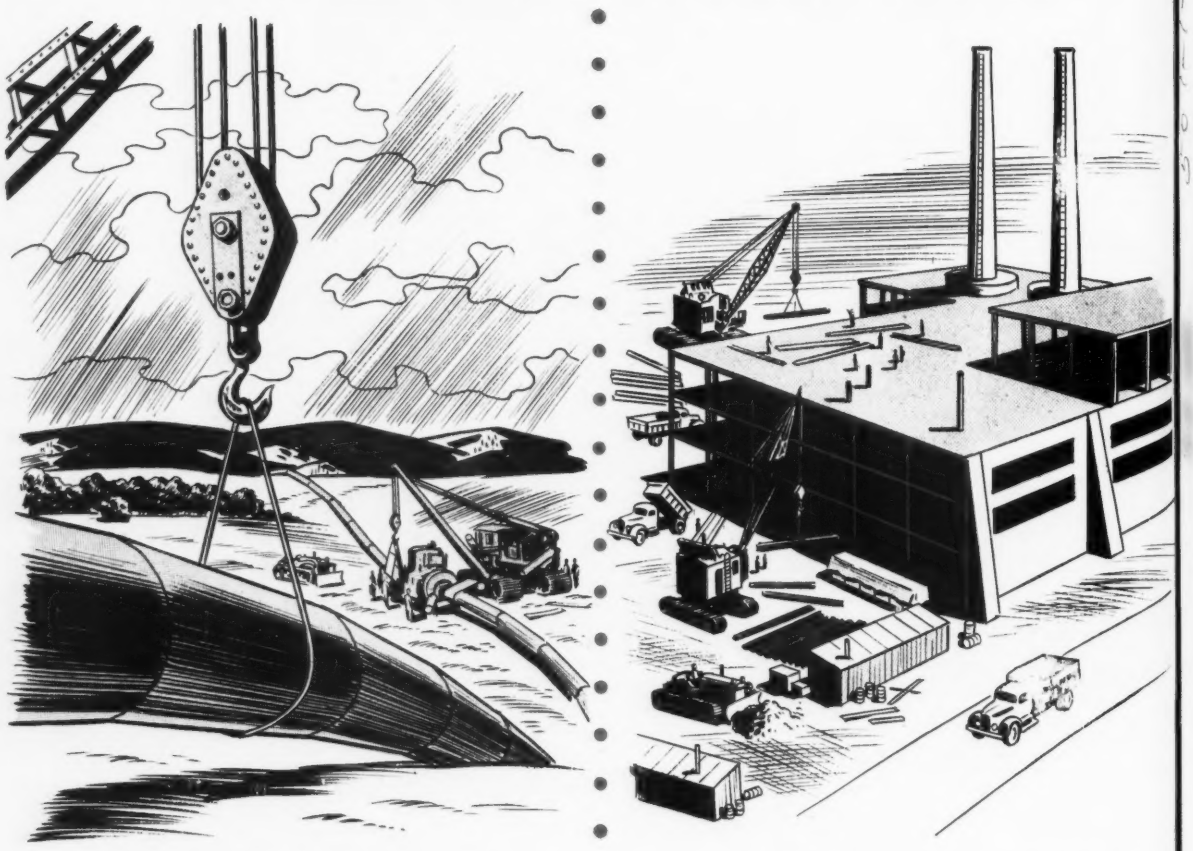
General Offices: 21 E. Second Street, Tulsa, Okla.

*Subsidiary of Bethlehem Steel Corporation*

On the Pacific Coast Bethlehem Oil-Field Equipment is sold by Bethlehem Supply Company of California

XUM

# FROM PIPE LINES TO PAPER PLANTS



## BROWN & ROOT is geared to do the job BEST!

**Whether your project calls for a pipe line or paper plant — refinery or chemical plant, Brown & Root is prepared to meet your exacting demands efficiently. Thirty-five years' experience in the industrial engineering and construction field assures clients the finest in planning, process analysis, architectural, and engineering skill.**

**Brown & Root's staff of specialists makes possible a completely integrated service including expert advice on plant location, thorough planning and supervision of construction, and delivery of ready-to-operate plant, all under one contract—one responsibility.**

**If your plans call for new construction or expansion, at your invitation a Brown & Root expert will gladly make a complete survey for you. Why not call or write today? There is, of course, no obligation involved.**

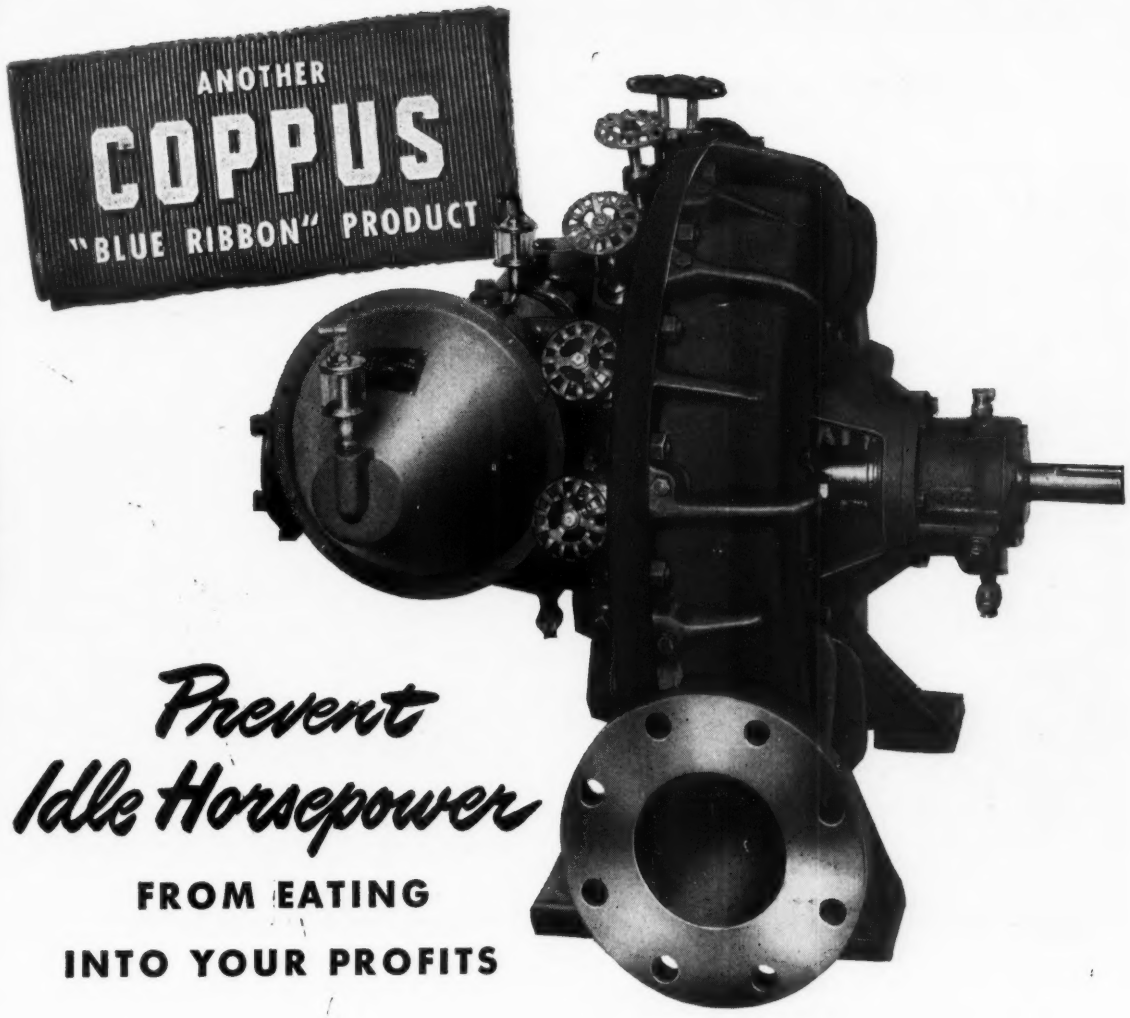
BROWN-BILT

BROWN & ROOT, Inc. *Engineers ▲ Constructors*

P. O. BOX 3, HOUSTON 1, TEXAS

CABLE ADDRESS — BROWNBILT

Associate Companies:— BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS INC.




# *Prevent Idle Horsepower*

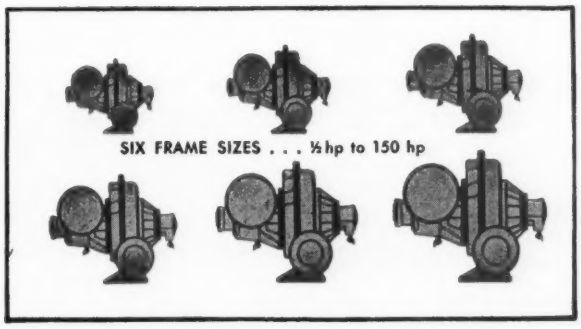
## FROM EATING INTO YOUR PROFITS

Paying for a larger turbine than you need is a waste of money you can easily avoid. Coppus "Blue Ribbon" Turbines are designed to meet small-power requirements exactly. Made in six frame sizes — fractional to 150 hp, and priced accordingly — they're hard-working, smooth-running, always dependable... the logical, economical drives for your pumps, blowers, fans and similar equipment.

Coppus precision-builds these rugged performers, checks their close tolerances with Johansson blocks, gives each a thorough dynamometer test before shipment. That's why you can count on them for the cost-saving efficiency built into all Coppus "Blue Ribbon" products — blowers, ventilators, gas burners, etc.

Since 1937, over 85% of all orders for Coppus Turbines have been repeat orders. Add their rapidly increasing use on top-name original equipment and you have conclusive proof of their ability to make good on the job — *your* job.

Send for Bulletin 135-10 COPPUS ENGINEERING CORPORATION, 263 Park Avenue, Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG.



# WHAT YOU NEED TO DRIVE TOO FAST FOR ROADS

A nation like ours, that drives and drives and drives, can't wait for roads. In its need for oil, it plunges into jungle and desert, over mountain and bog.

Dresser produces oil field equipment, mobile as cats, that cuts exploration and development from months to hours! The now famous *Rambler Rig*, complete for drilling and servicing, rolls over uncharted ground on tires or caterpillar treads, rises to drill position in minutes. A *Rambler* drilled 16 wells in twelve months in rugged Canadian wilds. Ideco's steel buildings, complete to cot and mattress, can be folded in minutes and follow on truck. Clark's Midget Angle compressor, though up to 300 b.h.p., is so vibrationless it is skid-mounted. Gas that might otherwise be wasted is saved by this semi-portable unit. And, under the worst conditions, Dresser Couplings enable pipe lines to be joined in weeks rather than months.

If you want to reduce months in the field to hours, write to Dresser about mobile equipment. The Biggest Jobs Are Going to Dresser Industries, Terminal Tower, Cleveland, Ohio. Write for details.

ROYAIRD & SEYFANG Mfg. Co., Bradford, Pa.
CLARK Bros. Co., Inc., Olean, New York
DRESSER Mfg. Division, Bradford, Pa.
DRESSER Mfg. Company, Limited, Toronto, Ont., Canada
INTERNATIONAL Derrick & Equipment Co., Richmond & Dallas, Texas; Toronto, Ont., Canada; Marietta & Beaverton, Ohio
KOBE, Inc., Huntington Park, Calif.
PACIFIC Pumps, Inc., Huntington Park, Calif.
ROOTS-CONNERSVILLE Blower Co., Connersville, Ind.
SECURITY Engineering Co., Inc., Whittier, Calif.
STACEY BROS. Gas Construction Co., Cincinnati, Ohio
Tulsa Pressure Engineering Division, Tulsa, Okla.

THE ONLY COMPANY **DOING AN OVER-ALL JOB—**

***From well to refinery***
***for the Oil Industry—***
***From source to storage***
***for the Gas Industry***

**DRESSER INDUSTRIES, INC.**

TERMINAL TOWER • CLEVELAND 13, OHIO

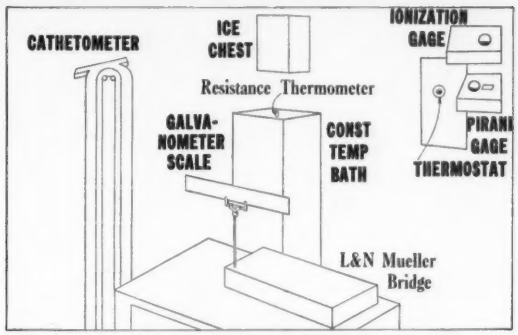
# Mueller Bridge for Measuring Temperature During Precise Vapor Pressure Studies

Apparatus for precise measurement of vapor pressures, photographed above and diagrammed at right, shows use of manometer, cathetometer, and G-2 Mueller Bridge at Bureau of Mines, Bartlesville, Okla. Manometer and sample container are immersed in the constant temperature bath. Before the compound to be studied is introduced into the container, the system is evacuated, using the Pirani gage to indicate pressure down to one micron and the ionization gage for lower pressures.

During measurements, the cathetometer is used to read the vapor pressure as indicated by the mercury manometer. The thermostat automatically regulates the bath temperature, and the Mueller Bridge precisely indicates temperature of the sample.

Two features make the G-2 Mueller Bridge suitable for this type of work:

Wide Range: The Bridge is calibrated in ohms, with a resistance range equivalent to temperatures of —190 to +500 C.




High Precision: The Mueller Bridge offers the limit of certifiable precision. It measures the resistance of its 25-ohm platinum resistance thermometer, within a limit of error of a few ten-thousandths of an ohm, or a few parts per hundred-thousand, whichever is greater.

Catalog EF22-33(1) describes the instrument in detail. Write to Leeds & Northrup Company, 4959 Stenton Ave., Philadelphia 44, Pa.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jrl. Ad E-33-241(1c)

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TRUCO STANDARD
OIL FIELD BIT

# TRUCO DIAMOND DRILL BITS mean

## *Irresistible Cutting Power*

Since the advent of diamond coring in the oil fields Truco engineers have made many improvements in design and matrix to increase footage in different formations and to permit increased circulation rates to maintain good mud and hole conditions.

Truco Bits penetrate the hardest known formations and 100% core recovery is usual—a standard of performance which is beyond improvement. Truco diamond drilling products include diamond washover shoes, reamers and all necessary adjuncts to every drilling condition and emergency.

**WHEEL TRUEING TOOL COMPANY**
3200 W. Davison Avenue
Detroit 6 • Michigan

**WHEEL TRUEING TOOL CO. of CANADA, LTD.**
575 Langlois Avenue
Windsor, Ont. • Canada

Truco Oil Field Products are distributed by

DRILLING & SERVICE, INC., DALLAS, TEXA

XUM

COC
*pipe*

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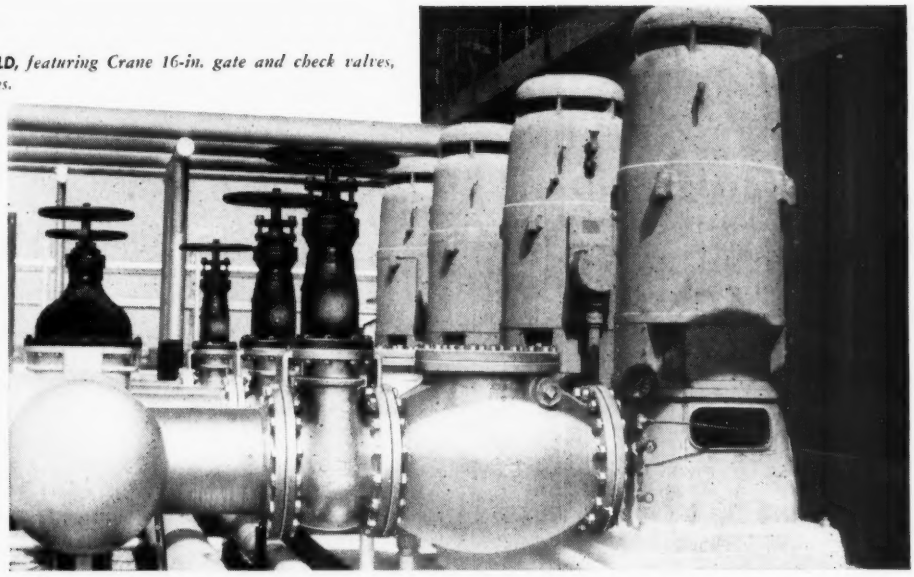
*cling p*

EV

MARC

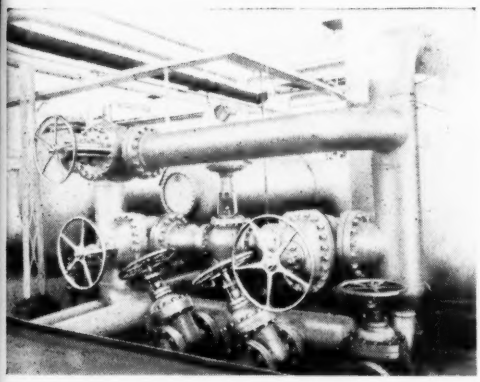
XUM



**COOLING TOWER MANIFOLD,** *featuring Crane 16-in. gate and check valves, pipe and pipe line accessories.*

# Nothing finer in refinery piping . . . and from one complete line

**ONE** SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY



**ONE ORDER TO CRANE** *covers all piping materials for recycling plant processing systems, for example.*

For proof, just pick up your Crane Catalog the next time you're looking for piping equipment. There you'll find the world's most comprehensive selection of valves, fittings, pipe and accessories . . . all conforming to rigid refinery specifications. One order through local Crane Branches or Wholesalers covers everything, for power, processing or general service installations.

To get widest benefit from standardization practices, it pays to rely on Crane—the **ONE Source of Supply** complete enough to simplify every piping procedure. You get better installations and avoid needless delays when you put **Complete Responsibility** on Crane for materials. And for **High Quality** in every item that assures dependable piping performance—get Crane Quality, unsurpassed for more than 90 years.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Illinois
*Branches and Wholesalers Serving All Industrial Areas*

*EVERYTHING FROM . . .*

VALVES
FITTINGS
PIPE

# CRANE

PLUMBING
AND
HEATING

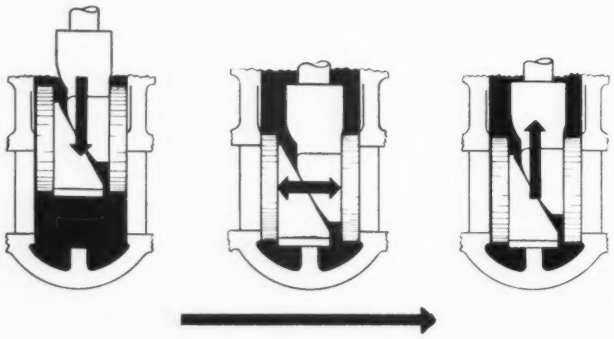
*FOR EVERY PIPING SYSTEM*



XUM

# *Ingenuity in gate valve design fulfills seven objectives**

## ELIMINATION OF DISC-TO-SEAT FRICTION AND GALLING

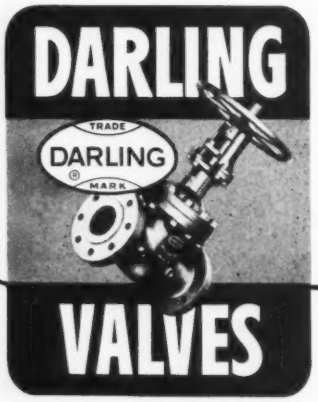


THOUSANDS of valves are ruined every year because their design makes it necessary to "jam" them shut and "break" them open. The valve discs and seats are subjected to severe friction and galling, a major cause of leaks, unreliable performance and excessive maintenance cost.

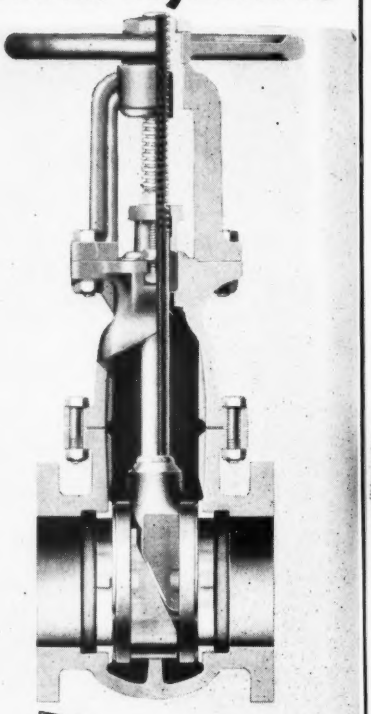
The above sketches show how this condition has been completely eliminated in the unique design of Darling Fully Revolving Double Disc Parallel Seat Gate Valves. The discs are lowered all the way with minimum disc-to-seat friction. Next, the positive wedging action spreads the discs for tight contact against their seats. When opening the valve, the first turn of the stem completely releases wedging pressure on the discs.

This is a unique, positive release feature—one of the principal reasons why hundreds of users have found Darling Valves so reliable and easy to operate—sure to last longer, with minimum maintenance cost.

**DARLING VALVE & MANUFACTURING CO.**
**WILLIAMSPORT 1, PA.**




Outline your needs and ask for specific data on the proper Darling Valves . . . or send for the complete 300-page Darling Catalog No. 17M. It describes Darling Valves of *all* types and is full of valuable information.



*This advertisement is one of a series showing how the unique Darling Fully Revolving Double Disc Parallel Seat Gate Valves answer the following critical operating problems:

- Positive, easy closing—regardless.
- Automatic adjustment for valve body distortion.
- Elimination of disc-to-seat friction and galling.
- Uniform wear distribution.
- Extreme simplicity.
- Greater service life.
- Simplified mainten nce.

*Darling Parallel Seat Gate Valves are available in a wide range of sizes and constructions for all types of normal and unusual service, and for pressures up to 3000 pounds. Likewise, Darling Taper Seat, Solid or Slotted Wedge Gate Valves are available for most services.*

**CORROSION RESISTANT VALVES**

*In addition to conventional iron, bronze and steel constructions, Darling specializes in valves for any corrosive fluid: iron body valves with special alloy trim; iron body, rubber lined with special alloy trim; all bronze; and all special alloy. Darling's 50 years of experience in meeting unusual requirements is always at your service.*

**THE VALVE MARK OF QUALITY . . . WATCH FOR IT**

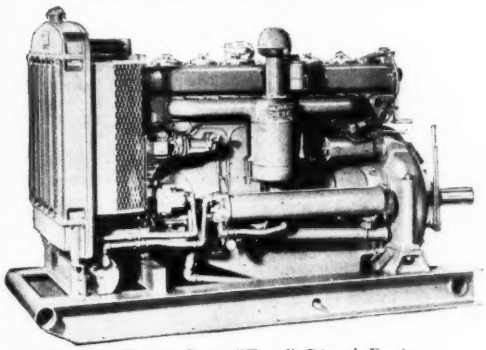
# The MURPHY DIESEL is built for heavy-duty, continuous service!

*the Murphy Unit Injector*

**. . . heart of the MURPHY DIESEL**

**A simple dependable unit injector for each cylinder serves as both pump and nozzle and eliminates all high pressure fuel lines.**

*Above, right—Two 150 H. P. continuous, 180 H. P. intermittent, Murphy Diesels power this mud pump. Three other Murphy Diesels are used to power the draw works.*



*Murphy Heavy Duty "True" Diesel Engines and Power Units 90 to 190 H.P.*

*Generator Sets 60 to 116 K.W., A.C. or D.C.*

## it's a "True" diesel

By utilizing maximum power in the fuel, the "true" diesel operating principle—solid fuel injected directly into a plain open combustion chamber—makes it possible for the Murphy Diesel to deliver more heavy-duty power, continuously. The absence of pre-combustion and pre-mixing chambers reduces turbulence within the cylinder, conserving the heat of compression for immediate ignition and controlling temperatures of pistons, valves and cylinder liners to reduce wear.

Such features as unit fuel injection . . . four valves per cylinder . . . flywheel end cam drive . . . oil cooled pistons . . . and through tie bolts further insure Murphy Diesels' ability to fulfill the toughest sustained heavy-duty power requirements.

Have your Murphy Diesel Dealer give you all the facts today—and ask him for a copy of the booklet "7 Questions to Ask a Diesel Engine Salesman".

**MURPHY DIESEL COMPANY**

5305 West Burnham Street Milwaukee 14, Wisconsin

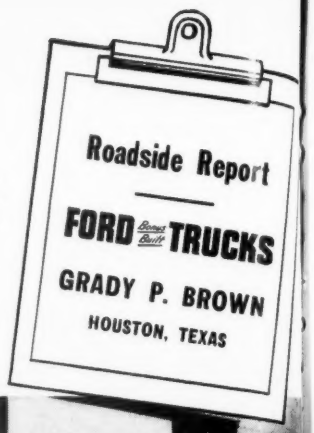
**MURPHY DIESEL**

***LOWEST ULTIMATE POWER COST***

**FACTORY BRANCH—SALES, PARTS and SERVICE**

**113-17 SOUTH ELWOOD STREET, TULSA, OKLAHOMA**

# "Our FORD stays in line with tractors costing more"



"REGARDING the performance of our F-7 tractor, I can say it has filled the bill in every respect," writes Grady P. Brown whose Ford Truck is engaged in gasoline transport in the Houston, Texas area.

"It is now pulling a 4,835 gallon gasoline transport. Our Ford stays in line with other tractors costing considerably more and with a higher rated capacity."

Thus does Mr. Brown add his voice to a nationwide chorus of Ford Truck enthusiasts. Truck users everywhere are pepped up about Ford Truck performance. They love the luxury of the new Ford Million Dollar Cab. And they get the biggest bang out of Ford Bonus Built construction . . . the superstrong construction that contributes to long truck life. Life insurance experts prove Ford Trucks last longer.

## ONLY THE FORD BIG JOB HAS ALL THESE FEATURES!

- ★ New 145-h.p. Ford V-8 engine for top performance.
- ★ Ford exclusive concentric dual-throat carburetor for more power, more economy.
- ★ New heavy duty 5-speed transmissions for operating flexibility.
- ★ Big Ford 16-inch by 5-inch rear brakes in the F-8; 16½-inch by 3½-inch in the F-7.
- ★ Ford Super Quadrax 2-speed axle with vacuum shift for performance flexibility in Model F-8 (single speed axle also available); single-speed Quadrax Hypoid Axle in Model F-7.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Exclusive Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

*Gross Vehicle Weight Ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.*

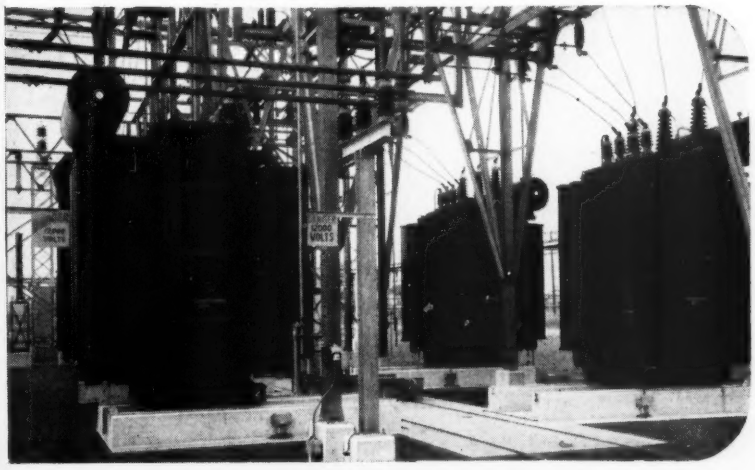
FORD 1949 Bonus Built TRUCKS 1953

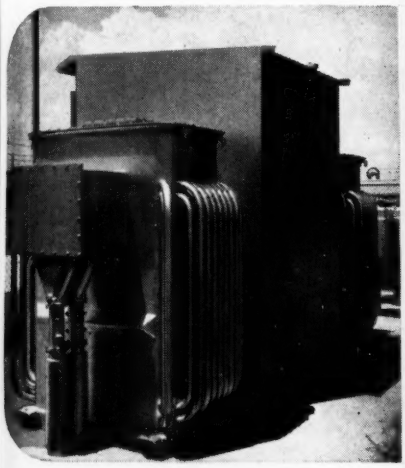
**BUILT STRONGER TO LAST LONGER**

USING LATEST REGISTRATION DATA ON 5,444,000 TRUCKS, LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

# power
## FOR PRODUCTION

This bank of Wagner Power Transformers is part of the main substation at the Houston, Texas Refinery of Shell Oil Company, Inc.





A Wagner Unit Substation, one of several small substations serving in the same plant.

In addition to power transformers, Wagner manufactures Rural Line, Distribution and Substation Transformers. Whatever your transformer requirements may be Wagner can furnish the exact type of transformer to fit your need.

# Wagner
## TRANSFORMERS

## can solve your power planning problems

These power transformer installations, part of the recent catalytic cracking and lubricating oil plant extension at the Houston, Texas Refinery of the Shell Oil Company, are typical of Wagner Transformer installations for industrial power systems.

Wagner Power Transformers have established enviable records for continuous service in thousands of industrial plants and on transmission lines from coast to coast. Carefully controlled production methods, highest quality materials, rigid inspection and tests, and more than fifty-five years of transformer engineering experience mean that you can count on Wagner Transformers for dependable performance, plus added safety . . . added economy . . . and added service.

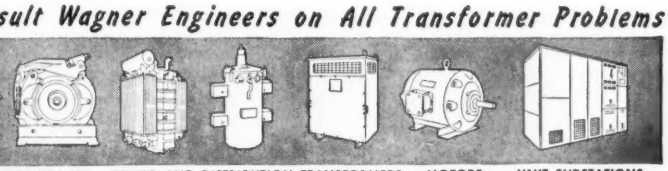
Users of power transformers will find it to their advantage to consult Wagner engineers on all of their transformer requirements. Wagner transformer users also profit by speedy, nationwide service facilities. Twenty-nine branch offices, manned by trained field engineers, are ready to serve you. Write for Bulletins TU-180 and TU-181 for information on the complete line of Wagner Transformers.

**Wagner Electric Corporation**

6389 PLYMOUTH AVENUE, ST. LOUIS 14, MO., U. S. A.

Wagner Electric Corporation EST. WE 1891

*Consult Wagner Engineers on All Transformer Problems*



BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

**ELECTRICAL AND AUTOMOTIVE PRODUCTS**

T49-2A

KAYDON ANGULAR THRUST BEARINGS—USED ON ROTARY TABLES OF OIL DRILLING RIGS

# CONTACTING KAYDON was the RIGHT IDEA for IDECO*

No manufacturer of heavy-duty machinery can afford to compromise on bearings, the very heart of efficient operation... particularly in powerful oil field rotary tables where the tremendous loads demand super-rugged, high precision bearings.

IDECO is one of many of America's outstanding machinery builders who find **KAYDON** Bearings are right! On the 14½" IDECO Rotary Table for Drilling Rigs 22.750" OD bearings are used . . . the 17¼" IDECO Streamlined Rotaries use bearings 29.250" OD . . . the 23", 36.000" OD bearings . . . the 27½", 39.625" OD bearings . . . big, rugged, but smooth and reliable in performance as a fine watch movement!

*International Derrick & Equipment Co. — One of the Dresser Industries

Other heavy machinery engineers also find it's the right idea to "Contact **KAYDON**" for bearings that more than meet the demands of steel mill and paper mill machinery, excavators, loaders, cranes, hoists, crushers, food processing and all types of heavy-duty equipment.

**KAYDON** *Types of Standard or Special Bearings:*

Spherical Roller
Taper Roller
Ball Radial
Ball Thrust
Roller Radial
Roller Thrust

Counsel in confidence with **KAYDON**. Capacity now available for all sizes and types of **KAYDON** Bearings.

THE KAYDON ENGINEERING CORP., MUSKEGON, MICH.

*All types of Ball and Roller Bearings 4" bore to 120" outside diameter*

# Keeping stainless steel STAINLESS

## . . . a typical problem in fabricating alloy piping

Heat a piece of stainless steel pipe to bend it and right away you're up to your ears in metallurgical complications. To begin with, stainless steel isn't just one alloy. There are hundreds of different types of stainless steel, each selected for its resistance to corrosion or its stability at high temperatures. To maintain the metallurgical properties which dictate the choice of a particular alloy steel, you have to know the temperature range within which this steel may suffer excessive metallurgical changes. And you have to have specialized equipment to maintain the precise control necessary to avoid these hazards.

Grinnell pipe fabrication equipment includes specially designed gas-fired radiant heat furnaces for this precisely controlled heat treatment of stainless steels and other alloy steels. Multiple burners are strategically located to distribute temperature uniformly and to prevent harmful flame impingement. Precision instruments regulate temperature and time.

It's an intricate business . . . fabricating alloy steel piping. It's a job for Grinnell prefabricating plants because Grinnell has the equipment and modern methods, the interpretive engineering, the metallurgical research facilities and the skilled personnel.

99 YEARS WHENEVER PIPING IS INVOLVED

# GRINNELL

Grinnell Company, Inc., Providence 1, Rhode Island. Branches: Atlanta • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston Long Beach • Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

# *Piping Hot*

## AT 10° ABOVE ZERO

## –Pipe takes on its Protective Overcoat

On the line, welded joints are coated with NO-OX-ID XX heated in a portable kettle and ragged on. No. 7 NO-OX-IDized Wrapper is applied and sealed with NO-OX-ID XX.

BECAUSE the wide range of NO-OX-ID consistencies provides excellent corrosion protection regardless of the weather, this 24″ natural gas line was coated and laid in near-zero temperatures. Primed and coated with hot applications of NO-OX-IDs, and then NO-OX-IDized Wrappers, this line, from past performance records, is assured of a minimum of ten years' service, without leaks or replacements.

NO-OX-IDs are versatile protective coatings for hot or cold climates, for hot or cold applications, easy to use under any conditions.

Completed section, with welds protected with NO-OX-ID, being laid. Outer wrapper is kraft paper for protection of coating in transit and during stringing.

NO-OX-ID IRON-OX RUST

Dearborn
Reg. U.S. Pat. Off.

THE LEADER IN RUST PREVENTIVES AND BOILER WATER TREATMENT

**DEARBORN CHEMICAL COMPANY**

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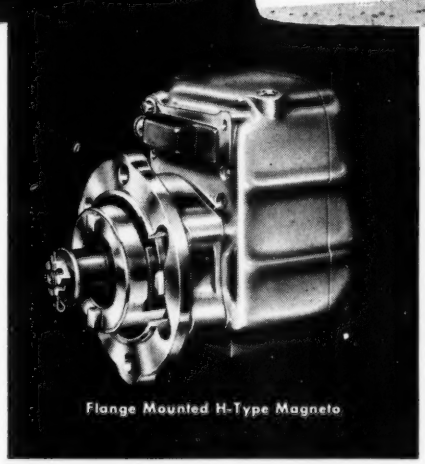
XUM

## When Old Style Magnetos Give Up...

# BENDIX-SCINTILLA

## H TYPE MAGNETOS...

Base Mounted H-Type Magneto



Flange Mounted H-Type Magneto

*TRADEMARK

### Just Keep Sparking Along!

Dependability isn't something seasonal—it's a year around proposition and there are no short cuts in building it into engines. Specifying component parts you know will stand up under all operating conditions is the *only* answer! Ignitionwise, no magneto of its type will out-perform or out-last the Bendix-Scintilla* H Magneto. Our long experience in building ignition equipment for the vast majority of aircraft engines is reflected in this magneto for one-cylinder engines. Include the Bendix-Scintilla H-Type Magneto in your specifications. For further details, see your distributor or write the factory direct.

### OUTSTANDING FEATURES YOU'VE ASKED FOR

- Waterproof coil
- Waterproof, high-tension outlet
- Higher voltage at starting speeds
- Constant spark over entire speed range
- Equipped with impulse coupling
- Compact and sturdy construction

SCINTILLA MAGNETO DIVISION of

Bendix AVIATION CORPORATION

BENDIX SCINTILLA

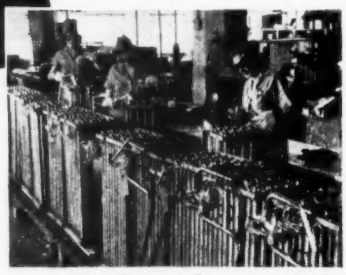
SIDNEY, NEW YORK

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

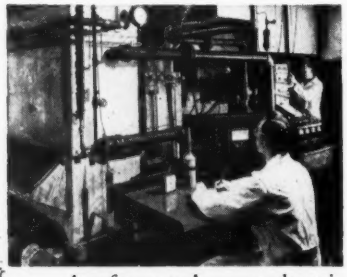
# *Take advantage of this*

# UNEQUALED EXPERIENCE
# UNEQUALED PRODUCTION

Aerofin manufactures finned heat-transfer surface exclusively. The experience gained by such specialization permits the selection of just the right surface and materials for each particular job — for each application.



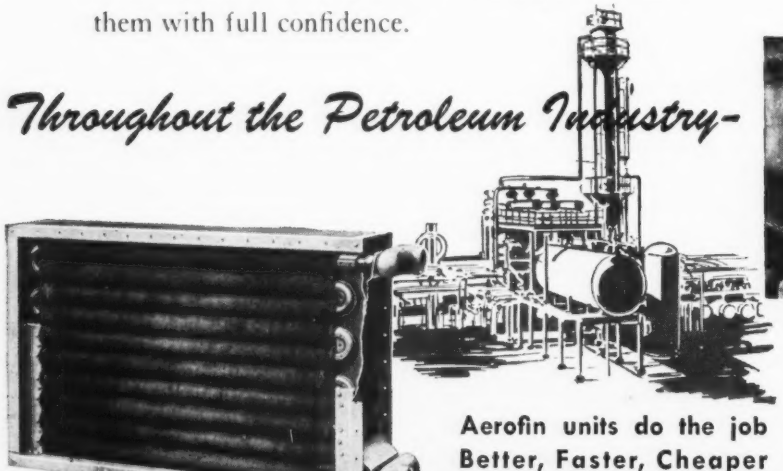
Attention to the many details that make up the completed unit typifies the Aerofin way. For instance, in this particular coil, careful brazing of the return tubes to the header plates assures leak-proof construction.



Aerofin controls every phase in the production of its finned heat-transfer coils and units. This control is maintained by rigid specifications and inspection, and all assembly is done in the Aerofin plant.

When you specify Aerofin finned heat-transfer surface, you specify high efficiency, long life and easy maintenance. As pioneer in the field, Aerofin has developed unequaled know-how and production facilities to apply to your particular heat-transfer application. Continual research accounts for the accuracy of Aerofin's published ratings. You can use them with full confidence.

*Throughout the Petroleum Industry—*



**Aerofin units do the job Better, Faster, Cheaper**

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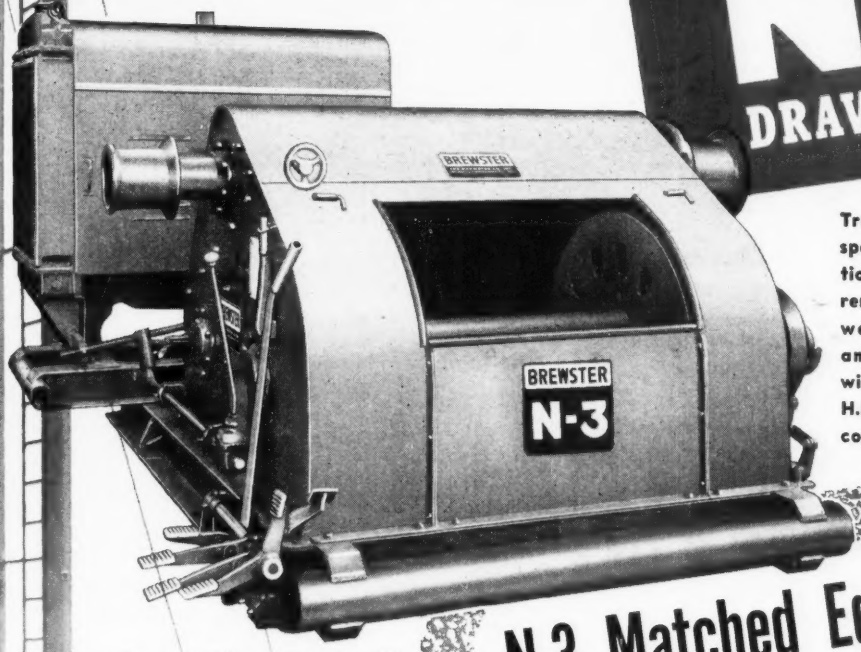
# Driller's FAVORITE

## FOR DRILLING TO 3500' · SERVICING TO 7000'

# BREWSTER N-3 DRAWWORKS




Transmission has 4 forward speeds; 1 reverse. Front section of drum guard easily removed for well servicing work. Available in single and double drum models with any popular make 145 H.P. engine. Write today for complete information.

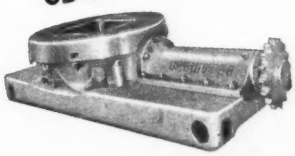
Compact—portable—extremely efficient—the Brewster N-3 Drawworks meets every requirement for fast, economical shallow drilling.

## N-3 Matched Equipment

3-S SWIVEL

H-50 BLOCK

OB-12-L ROTARY



he Brewster N-3 Drawworks is available with 55' or 5' telescoping mast. Shown here, mast is in first position—ready to be raised by drawworks motor to 5' or 65'. Three sheave crown block is integral part of mast.

Write for Catalogs

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**BREWSTER**
*Drilling Equipment*

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GARLOCK 430 CHEVRON.....for hydraulic service
GARLOCK 431 CHEVRON for oils at low temperatures
GARLOCK 530 CHEVRON.....for steam, air or gas
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Twenty-four hours service everyday for 4½ years—39,420 hours of operation—that's the service record for a set of GARLOCK 430 CHEVRON packing in a brine circulating pump in a cold storage plant as reported by one of our customers.

Every set of CHEVRON packing may not last 4½ years, but you can be sure that every set of CHEVRON will give you long, dependable service. The exclusive hinge-like construction of CHEVRON packing permits expansion as pressure increases and contraction as pressure decreases, thereby reducing friction to a minimum. For long life and economy—specify CHEVRON.

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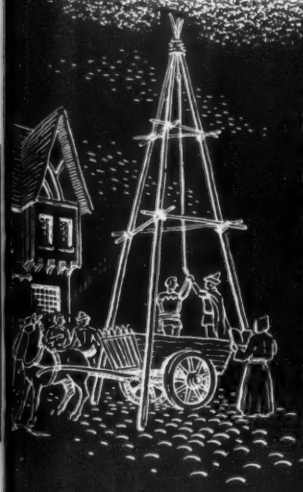
Tulsa, Okla. Houston, Texas Los Angeles, Calif.

## GARLOCK *Chevron** PACKING

*Reg. U. S. Pat. Off.

# WHY DO YOU CALL IT A *Derrick?*



That word you use so often—Derrick—had an origin far removed from the oil country. It is traced to the seventeenth century. A hangman of Tyburn, near London, was named Derrick. Derrick built a gallows which was dubbed "the three-legged mare" and "Tyburn tree." Thereafter, such structures came to be known as "Derricks."

Continental is another name well known throughout the oil country. It's a name that for more than 36 years has come to be known to mean quality equipment and good—good—service.

When you see the Continental "Green Triangle" you have solved your equipment and service problems.

**WHERE IT GOT ITS NAME** . . . If you have an unusual slant on a name commonly used in the industry, its origin and why, please send it to us. Other oil men will be interested.

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SERVING THE OIL AND GAS INDUSTRIES

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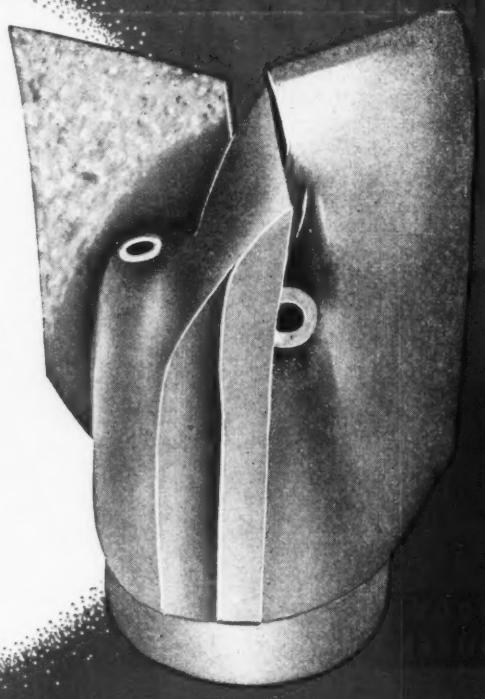
# HUNT EXPORT MODEL BITS...

*STILL the accepted standard of foreign operators!*



*Why?*

**WORN BLADES *EASILY REPLACED IN THE FIELD***

**...WITHOUT Jigs**

**...WITHOUT Gauge**

**...WITHOUT Fixtur**

**...WITHOUT Grindi**

**...WITHOUT Troubl**

Over three years ago we began production of our current models of Hunt Export Model Bits. These Hunt Bits proved to be the best then—they're *still* proved the best—and *still* made the same way for that reason.

Foreign operators everywhere immediately accepted Hunt Bits—made them their STANDARD—and Hunt Bits are *still* THE STANDARD of foreign operators all over the world.

Built in 2-way, 3-way and 4-way types . . . with replaceable blades of heat-treated alloy steel in all sizes up to 25" . . . with blades factory-ground sharp and to gauge . . . with fool-proof design for quick, *easy* changes right in the field—you can't equal Hunt Bits for long service and low-cost per-foot-of-hole!

*Write today for our illustrated folder.*

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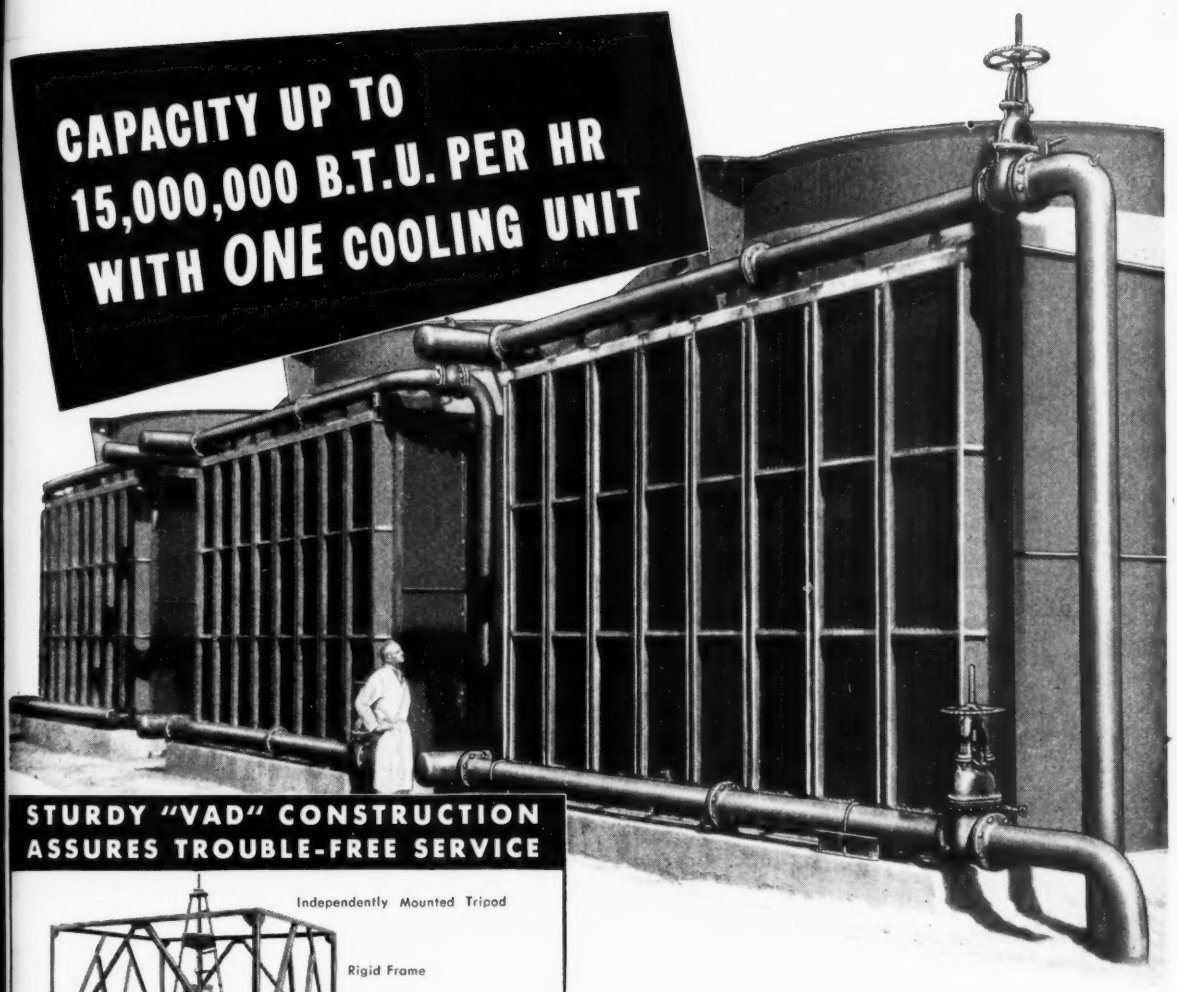
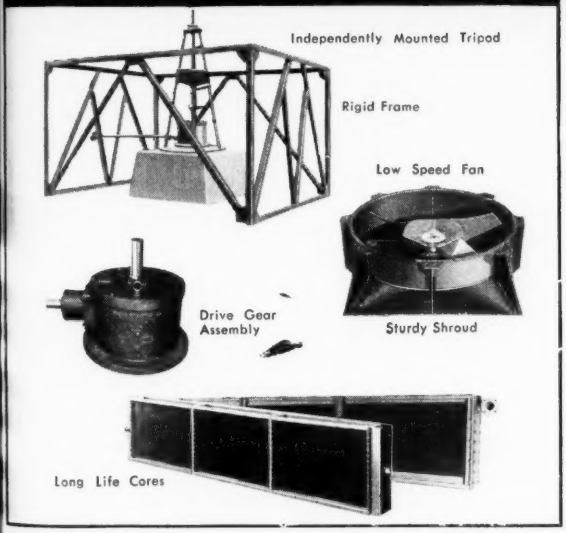
A BUSINESS BUILT ON *Good* SERVICE

# CAPACITY UP TO 15,000,000 B.T.U. PER HR WITH ONE COOLING UNIT



## STURDY "VAD" CONSTRUCTION ASSURES TROUBLE-FREE SERVICE




## YOUNG OFFERS EXTRA CAPACITY WITH THE SPACE-SAVING VAD

VERTICAL AIR DISCHARGE

● There's a VAD model capable of dissipating from 3,000,000 to 15,000,000 BTU per hr. and for cooling water, oil, gas and condensing steam and vapor, *in any combination of services!* A multiple installation of these units will handle any cooling problem. Such versatility and reserve cooling capacity has earned an enviable reputation for the VAD, successor to the famous QUAD and giant in the Young line of heat transfer products. Such features as improved design, fewer piping connections, factory built sub-assemblies, low-level mounting, vertical air discharge (which prevents lost efficiency due to cross-winds) . . . plus the special construction features shown at left . . . have made the VAD increasingly popular. If you have a BIG cooling job to be engineered, specify VAD, designed and manufactured by Young, specialists for more than two decades in the development of oil field and industrial cooling and condensing equipment. Write for Catalog 448.

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## There's a Bucyrus-Erie Spudder for each of these ranges:

| DRILLING (ft.) | 1500 | 2500 | 3500 | 6000 |
|---|---|---|---|---|
| SERVICING (ft.) | 2000 | 3000 | 4000 | 7000 |
| MODEL | 24-L | 28-L | 36-L | 48-L |

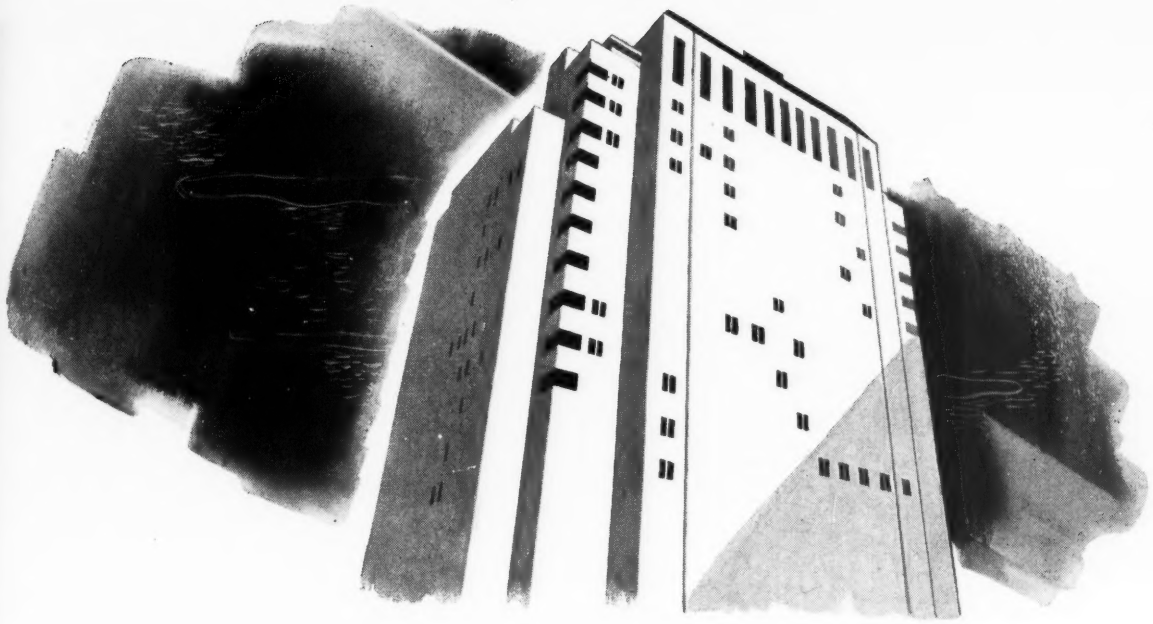
When you buy a Bucyrus-Erie Spudder you can pick the machine that meets your needs — you don't have to buy extra capacity or overload a small rig. Each Bucyrus-Erie is engineered from mounting to crown sheave for a definite range of work. Each model provides the speed, versatility, and mobility you need for most profitable handling of top-to-bottom drilling, tailing-in, and servicing operations in its job range. It will pay you to ask your Bucyrus-Erie spudder distributor for complete details. Bucyrus-Erie Company, So. Milwaukee, Wisconsin.

BUCYRUS ERIE

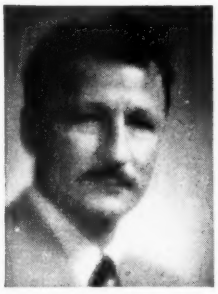
42548

*Swinging a 3000-lb. tool string, this 28-L drills from grass roots in Kern County, California.*

**See Your Bucyrus-Erie Spudder Distributor**



# *A Monument to Finer Living...*



***Glenn McCarthy***

*. . . oil wildcatter, sportsman, airman . . . head of 16 corporations and organizations, member of 14 more . . . oilman builder of McCarthy Center (1100-room hotel, 1200-car garage, 1750-seat theater, swimming pool, exhibition hall).*

In the priceless book of man's memory there shines in illuminated lettering the magic word, "Hospitality." As a city of importance, Houston ranks peak-high on the scale . . . as a city of hospitality, Houston reigns among the nation's friendliest.

And now may we present The Shamrock . . . hotel spectacular . . . symbol of hospitality in one of America's most hospitable cities. From its very beginning this was no ordinary hotel, for wound inextricably in the substances of its creation are the ambitious materials of a young man's dream.

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And so you see The Shamrock, Glenn McCarthy's contribution to Houston and to finer living . . . rising tall above Lone Star plains as a great monument to warm hospitality.

The eyes of Texas and of the entire nation are on Houston's . . . The Shamrock.

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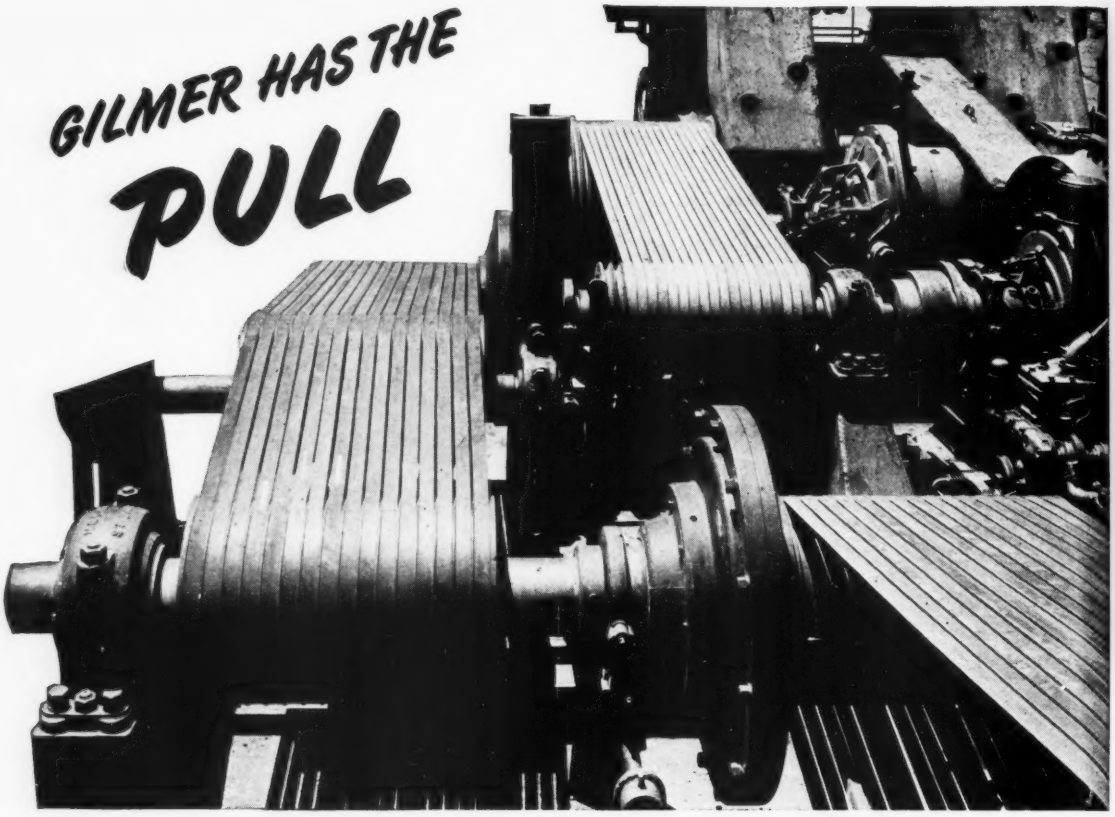
*In Houston, you are cordially invited to live at*

# The Shamrock

**A GLENN McCARTHY ENTERPRISE**

COMPLETE CONVENTION FACILITIES AVAILABLE—TELETYPE No. HO 192

GILMER HAS THE PULL



# You can always count on *Gilmer* MULTIPLE V-BELTS for Power and Performance

Gilmer Multiple V-Belts add extra pulling power to drilling rigs, pumps, power plants and other heavy-duty applications in oil field service.

Straight side-wall construction assures a firm grip; as the belt flexes around the sheaves, sides bulge outward and hug the grooves, unlocking freely the instant pressure is released. The rayon pulling cords are conditioned to control stretch within narrow limits. Jackets are extra tough and wear-resistant. For smooth, strong pulling power and long belt life, use Gilmer Multiple V-Belts.

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**GILMER ENGINEERS** will be glad to help with any of your power belt problems.

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Gilmer BELTS

# New! Automatic BIT-WEIGHT CONTROL

**. . . holds a pre-set bit weight accurately on any rotary rig—increases bit life and bottom-hole time—assures maximum drilling speed at less cost!**

Here's G-E's new *Automatic* Bit-weight Control, designed to hold any pre-selected weight on the bit accurately and automatically—regardless of drilling speed. Whether your rotary drilling rig is electrical, mechanical, or steam, automatic bit-weight control will give you these outstanding advantages.

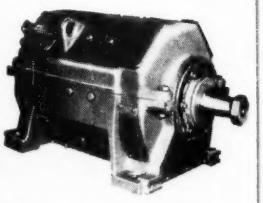
**STRAIGHTER HOLES** that get to the oil faster and cost less to drill.

**LONGER BIT LIFE** that cuts round trips for bit replacement and increases bottom-hole time.

**SIMPLER CONTROL** that permits your driller to give more time and attention to other duties.

**MAXIMUM DRILLING SPEED** that comes from automatically maintaining the right weight on the bit.

A new bulletin, complete with schematic diagrams, describes automatic bit-weight control. Send for your copy today.



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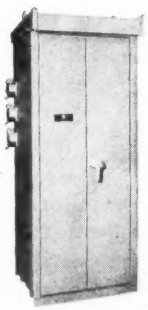

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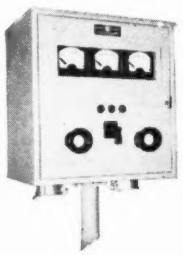

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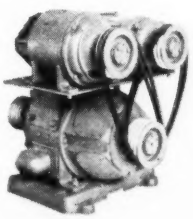
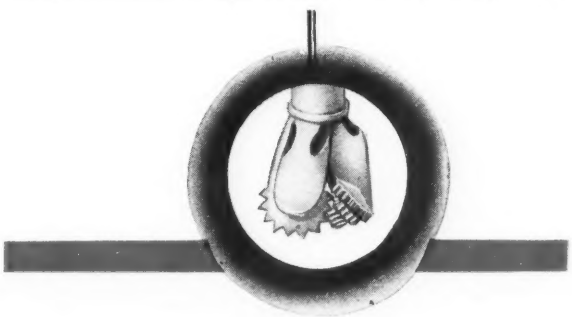


4.

**Only 4 Main Parts to the System:** (1) Drag generator—a 15-hp, 725-rpm, Type MD-604 motor—connected to the draw-works through a speed reducer. (2) Main control panel, enclosed in weatherproof cabinet. (3) Operator's control panel. (4) Amplidyne-controlled regulating generator and exciter.



**General Electric Company, Section D 654-84**
**Apparatus Department, Schenectady 5, N. Y.**

☐ Please send me Bulletin GEA-5055, Automatic Bit-Weight Control.

☐ In addition, please send me Bulletin GES-3485 which describes *Lease on the Future*, G-E's MORE POWER TO AMERICA film on oil-field electrification.

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Company_____

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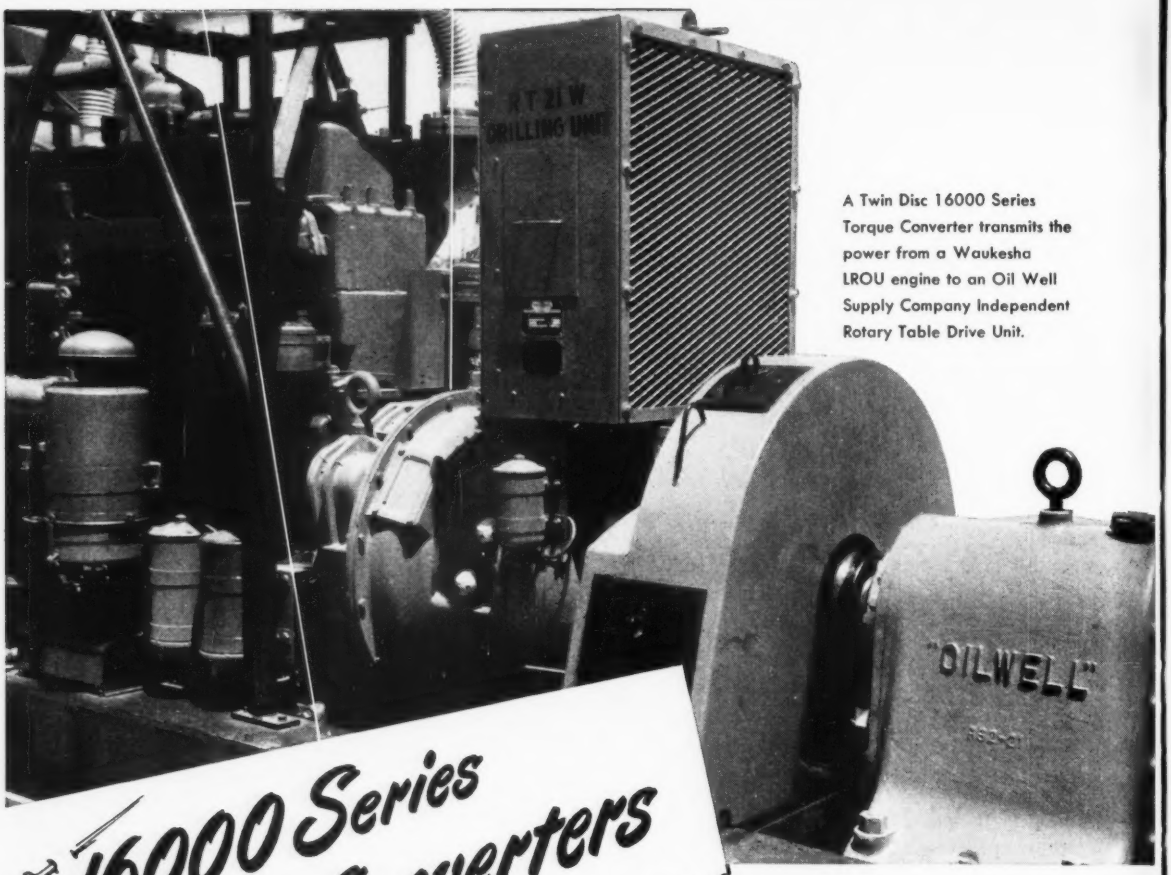
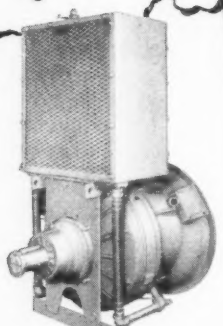
GENERAL ELECTRIC




A Twin Disc 16000 Series Torque Converter transmits the power from a Waukesha LROU engine to an Oil Well Supply Company Independent Rotary Table Drive Unit.

# 16000 Series Torque Converters

## ...for the 250—1000 hp Range



*Twin Disc 16000 Series Torque Converter*

Deep-hole drilling requires more power, and better power transmission equipment. That's why Twin Disc designed its 16000 Series Hydraulic Torque Converter—to meet the requirements of rigs using one or more engines in the 250 to 1000 hp class.

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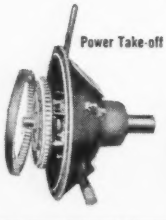


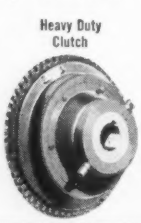


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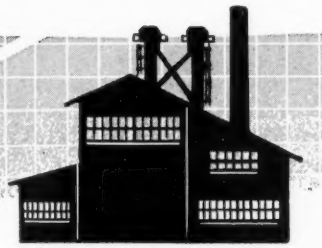

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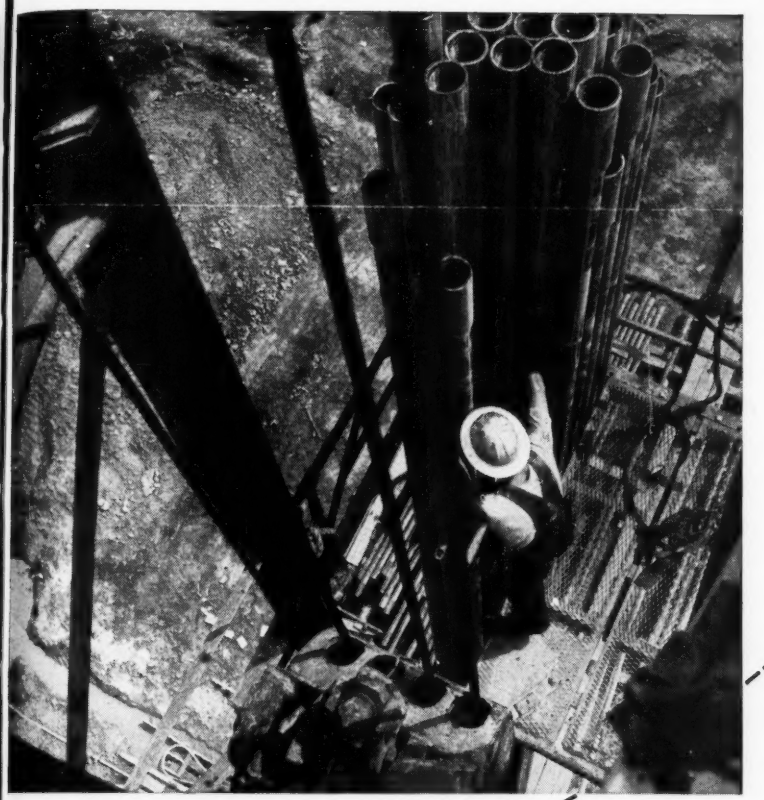

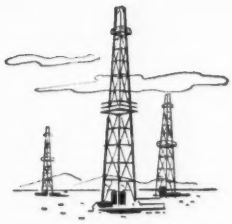

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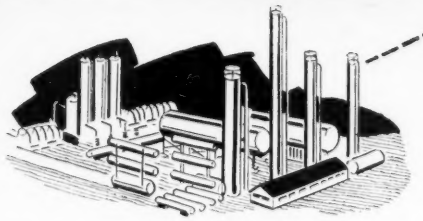

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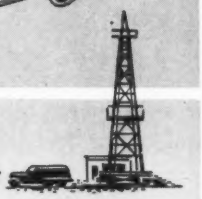

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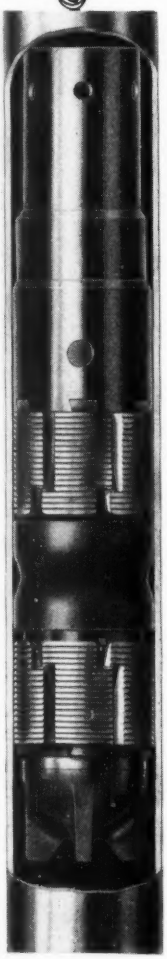

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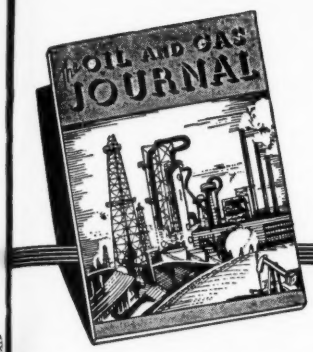


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# JOURNALLY Speaking

## More on Barnsdall

A RECENT suggestion here that Barnsdall Oil Co. is probably the oldest oil firm doing business continuously under the same name raised a doubt in the mind of R. W. Mercer of Producers Supply & Tool Co., Wichita Falls.

He asked his father, A. J. Mercer of Fort Worth, one of the pioneers of the oil business and still active at 88, and got this reply:

"In the year 1891 or 1892, T. N. Barnsdall came to me and said he wished to clean up all the small interests he had outstanding, as he intended to organize a company, and did not want to be bothered with small interests, and offered me $1,250 per barrel, which I accepted, and my interests with him in Ohio and West Virginia were merged into what is known today as Barnsdall Oil Co., and I think he did this on my advice given some little time previously. In 1897 I sold him the Logan Gas Co. of Ohio, which I organized after I had drilled the well at Sugar Grove, which opend that gas district. I was its president and supervised its construction. I was quite intimate with T. N. Barnsdall, and you can tell the world that Barnsdall Oil Co. was not organized before the year above mentioned. However, T. N. Barnsdall's father had been in the oil business some years before birth of the present Barnsdall Oil Co."

This is an interesting historical footnote, but it still doesn't disprove our belief that Barnsdall is the oldest name in oil.

## Please Omit Fernery

WE have been reading quite a bit lately about the "Young Turks" among the Republican Senators in Washington who are trying to put a little pep and modernism (we shay away from the word "liberalism") into the once Grand Old Party.

One of these self-styled Young Turks is Sen. Ralph E. Flanders of Vermont, whose geography, biography, and physiognomy would suggest that he is anything but a crusading reformer. Born in rock-ribbed New England in 1880, he started life as a machinist apprentice and would up being president of Jones & Lamson Machine Co. and president of the Federal Reserve Bank of Boston. He got to the Senate by appointment and, except for the twinkle in his eye, he is the physical embodiment of a dignified, portly, moustached, conservative, retired Yankee tycoon.

But he's not. Flanders is not at all satisfied with the status quo. He wants to reform a lot of things, including some of the most humble aspects of every-day life. Proof of this is the fact that he is a militant and outspoken member of the S.P.P.P.P.P.P.P.P., which, the senator explains, stands for the Society for the Positive Prevention of Putting Pulverized Parsley on Peoples' Plates in Public Places.

## Tidelands Ditty

TEXANS are awfully mad about the federal Government claiming their tidelands, but at least one of them has enough sense of humor to put his feelings into rhyme, as per a clipping which a reader sent us from a paper down that way:

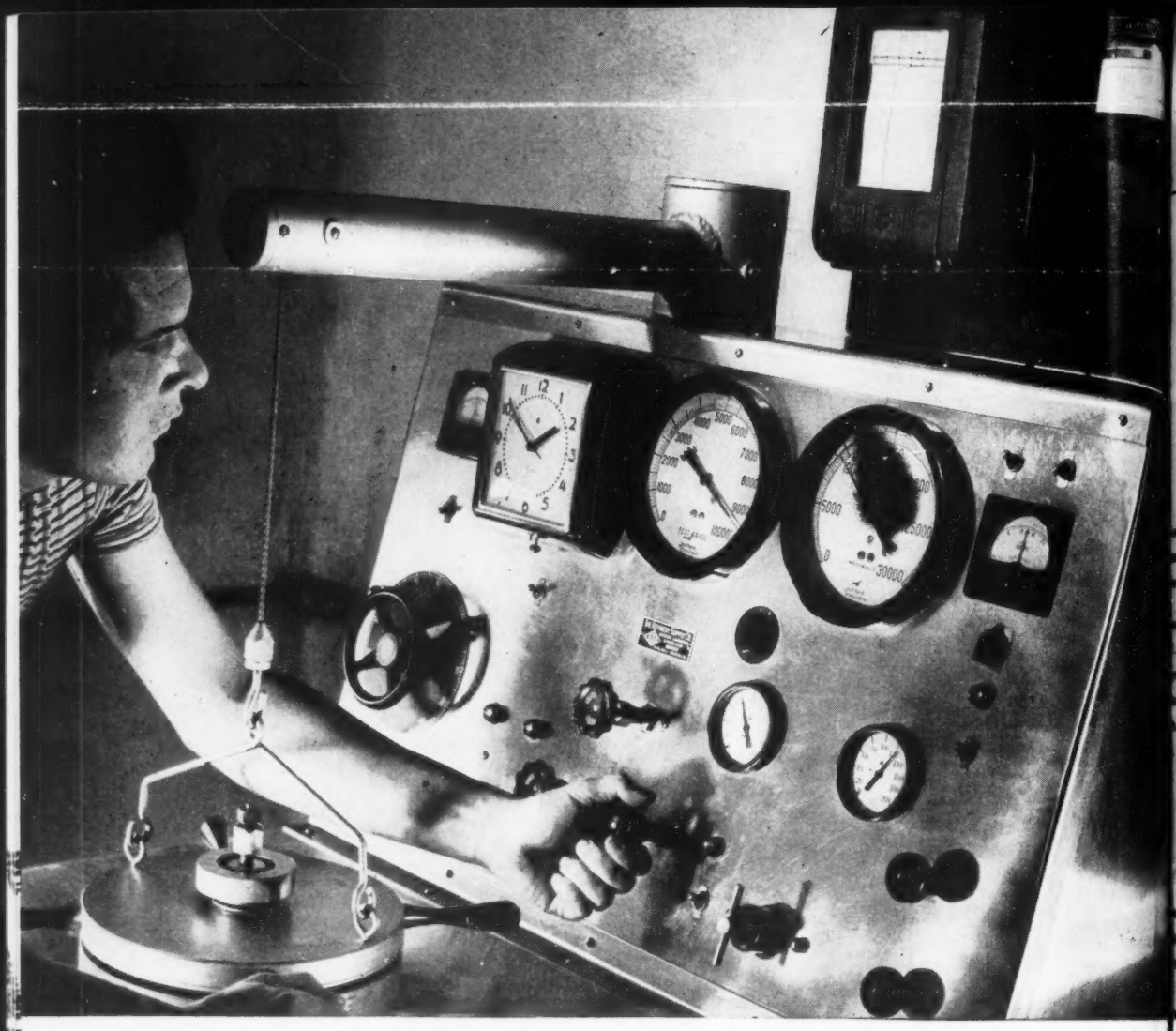
Now Uncle Sam, and Davey Jones,
And Texas can't agree
On who shall be the owner
Of oil wells in the sea.

While Uncle Sam claims it is his,
Our Jester's shouting "NO";
But nine old men, and Truman,
Are about to steal the show.

## Number, Please

TULSA, the oil capital of the world, has 53 WELLS, with 2 RIGGIN, and 1 DRILLING. There is a total of 11 CREWS, and 5 DERRICK(S). Six different SANDS were discovered in the city but records show only 2 CORE(S) with no SHALES but one. There is 1 GAGER and 2 OILER(S) in the city, 1 SWAB, and 49 KELLY(S). . . .

These figures are not the result of an extended research program carried out by the Journal's statistical department but are merely a few of the names listed in the Tulsa telephone directory.



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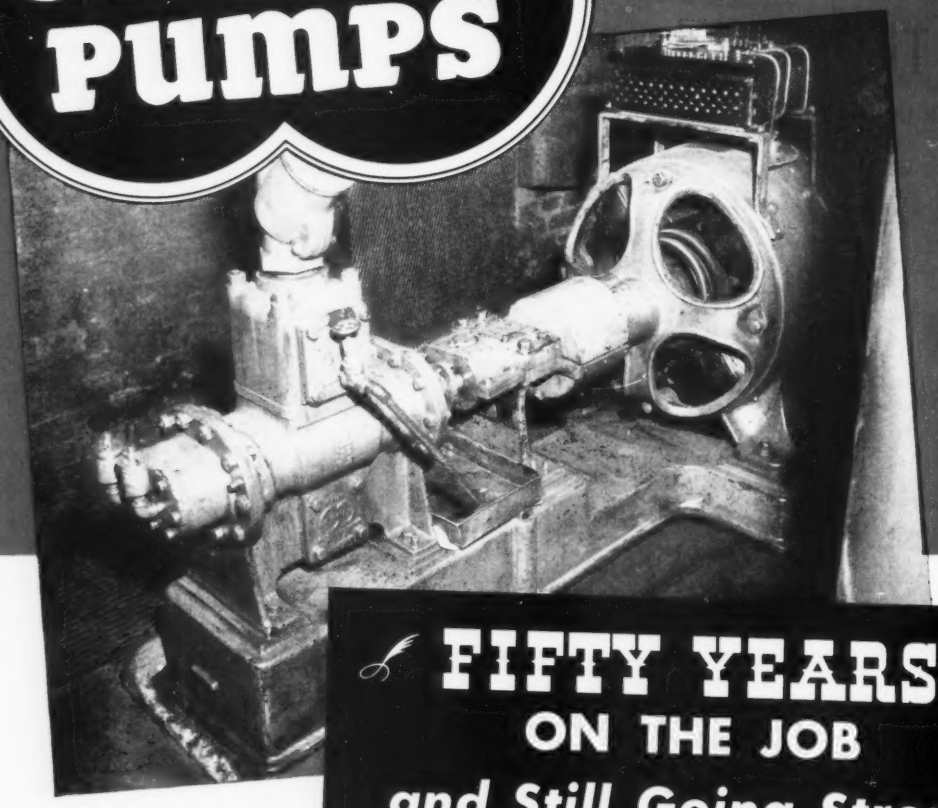

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THE OIL AND GAS JOURNAL

# The Storage Problem

THE problem of adequate storage space for crude oil and petroleum products is being widely discussed throughout the oil industry because of its bearing on the rate of crude production, full operation of refineries, and proper distribution of products.

In this issue of the Journal a staff writer analyzes the storage situation in a special article, and a statement by the chairman of the National Petroleum Council discusses the allegation that high inventories are a factor in the recent production cutbacks.

There are two schools of thought regarding storage. The one feels that large inventories are a constant threat to market prices. That this can be true is shown by the experience of the 1920's when tremendous stocks of crude above ground undoubtedly had a depressing effect on crude prices.

The other school holds that more storage space than is now available would increase the flexibility of the industry's operations in demand and prices. The weight of the argument would appear to be with this group, though this does not mean that every operator needs more storage or that total storage should be increased by a huge amount.

Figures show that the increase in storage space has not kept pace with the increase in volume of the industry's operations. It need not increase in exact ratio, but certainly more business requires more tankage since the seasonal nature of much of the industry precludes hand-to-mouth operations.

When a refiner finds his products moving at a slower rate than anticipated he must reduce his runs until he can make room for current output, and cut back his crude purchases accordingly. But if he is committed to take the crude he must dump his products below production costs in order to move them out of storage. Either alternative has an effect on the market, and it does not take many such cases to upset the entire industry.

If this situation were general it probably would indicate overproduction, but where it is due to local or seasonal conditions, as has been the case to date, it could be corrected in large measure by greater storage space for crude or products or both.

More storage space would give greater flexibility in all operations and permit individual refiners and distributors to absorb fluctuations in demand caused by unseasonable weather and other unpredictable factors. The present mild winter in the area most dependent on heating oils should not erase the memory of the shortage of distributors' stocks the two previous years.

The controlling factor in crude supply is underground reserves, and there would seem to be little danger that stocks of crude will ever reach the excessive levels of 20 years ago so long as the shortage of steel and high-cost construction continue and so long as both operations and state regulatory bodies remain on guard against aboveground waste.

# Proration Based on MER Formula Questioned by Texas Operators

***by D. H. Stormont***

DALLAS. — With eight shutdown days scheduled for the state's oil fields during March, Texas oil operators and conservation experts are beginning to examine the proration methods used by the Texas Railroad Commission and the results of their application.

In giving thought to the methods of allocation oil production among fields in the event more severe cutbacks are required to keep Texas' production within estimates of market demand, the chief question is whether the present MER basis of allocating production should be continued or whether more consideration will have to be given to demand for the various types of crude than rigid application of the MER basis permits.

The Texas Railroad Commission, by means of shutdown days, reduced the state's oil output by about 66,000 bbl. daily in February and for this month has ordered an additional cut of 200,083 bbl. Thus for the first 3 months of this year the state's allowable oil production has been lowered by some 515,000 bbl. daily, or a total reduction of about 21 per cent from the December level.

### Cuts Have Been General

These reductions largely have been accomplished by "across the board" cuts—straight percentage reductions in the production allocated to each field, regardless of well depths and demand for various types of crude oil. Only limited opposition was expressed to the use of general cuts at the recent statewide hearings, possibly because all Texas fields had been producing at or near their "maximum" or "most" efficient rates. If further and more severe cuts take place, however, more serious opposition no doubt will develop because of the economic and engineering considerations involved.

When Texas oil fields were undergoing their most severe proration, in 1940 and early 1942, the commission was allocating production between fields on the basis of market demand, acreage, and depth. During the war years, however, when every effort was devoted to obtaining as much oil as possible. the "maximum efficient rate" or MER basis was adopted. As its name implies, this method of allocation is primarily designed for use in setting the upper limit beyond which a field should not be produced.

The commission has continued to hold annual hearings for the purpose of determining the MER, "the highest productive capacity that can be obtained without causing preventable waste," for most of the state's flowing wells. Also, as new wells in new fields have been brought in, they have been granted discovery allowables which were dependent upon depth and their MER.

In arriving at the MER's for new fields, as well as annual hearings on old fields, the testimony as to a field's MER sometimes varies widely. Although admittedly estimates, and sometimes arrived at by devious methods, the MER figures submitted by operators are then weighed and determined by the commission.

### MER Never Contested

That engineers and conservation experts are generally in agreement as to MER being a fair method of allocating production between fields is witnessed by the fact that no operator has contested it in the courts. But, during the time this method has been in force, except for recent months, it has not been applied to any appreciable extent as a proration tool to keep production within market demand. It was primarily a conservation tool to prevent damage to any oil field because of overproduction.

At the recent statewide proration hearing held in Houston, testimony presented indicated that market demand is working against the MER basis of allocation. Several purchasers in West Texas stated they would like to see lower producing rates established in the sour-crude fields of that area because of lack of demand for that type crude oil. Lack of a market demand for heavy crude oils, such as the Talco field of eastern Texas produces, also was brought out.

Several purchasers, pointing to the rapid increase in West Texas crude in storage, asked that all reduction in alowables be confined to West Texas and that fields in the remainder of the state be left at their February levels. Commissioner E. O. Thompson took the attitude that since the Commission was handling statewide proration, any cut should be applied on a statewide basis. When it was pointed out that West Texas had received 73 per cent of Texas' increase in production in 1948, he stated that this had been accomplished without detriment to any other section of the state.

The commission did not follow the crude-oil purchasers' recommendations insofar as West Texas was concerned in setting the March allowables. If current conditions remain unchanged, however, some consideration may have to be given this situation or pipe-line proration may again be applied in West Texas.

From the engineering aspect, engineers point to the differences in producing characteristics of oil fields as a reason why fields should not be prorated on a flat percentage basis of their MER. Most reservoir engineers now feel that there is no optimum rate for each reservoir, i.e., a single and unique production rate which would insure maximum efficiency and ultimate recovery. Instead they believe that all oil fields will produce efficiently if restricted within the proper range of producing rates. For some fields this range of MER's may be relatively wide. For others the maximum efficient rate is secured within narrow limits. Reducing allowable on a percentage basis, therefore, may lead to some fields being produced inefficiently and result in preventable waste.

The above-mentioned reasons are only two of the more important considerations involved. Another is whether producing depths and attending higher investments in drilling costs are sufficiently considered when MER's are used as the sole basis for allocating production between fields in times when proration is necessary to keep production within market demand.

If Texas continues to add to its potential oil production at the same rate it has been, even more severe proration than the 21 per cent reduction made so far this year may be required. In this event, much more probably will be said at future statewide proration hearings as to maximum efficient rates, depths, market demand, and other factors which enter into the allocation of production.

## Mississippi Gas Board Names Technical Staff

The Mississippi State Oil and Gas Board has employed a staff of technical experts who will commence work on April 1. This expansion of the staff is in line with a directive of the 1948 State Legislature.

The new employes constitute the present staff of the Mississippi Oil and Gas Engineering Committee which was set up several years ago by Alec M. Crowell, J. K. Wright, Jr., who will become chief engineer of the Oil and Gas Board, is the present director of the committee.

Others employed by the board are: J. F. Borthwick, Jr., statistician; E. J. Burnet, field engineer; and Miss Margaret Foulks, record controller.

H. M. (Don) Morse is supervisor of the board, and James McClure, of Sardis, Miss., is chairman of the board.

# Hallanan Says Imports Declining, Petroleum Storage Not Excessive

IMPORTS of foreign petroleum, which currently are causing alarm in the oil industry, are declining and will be apparent within a few weeks, it is declared in a statement issued in Pittsburgh by Walter S. Hallanan, chairman of the National Petroleum Council.

Hallanan called on importers to follow the policy declaration of the council, representing the views of all branches of the industry, and expressed confidence that when this program is fully implemented it will restore the balance and dissipate fears in the industry.

He also discussed the stocks situation, declaring that the volume of crude and products in storage is not high compared with prewar conditions when measured in days' supply. Hallanan's statement follows:

"The situation with respect to increasing imports of oil, above and beyond the needs to meet our present consumptive demand that appears to be stabilized, is a most serious one and represents a very real threat to the nation's welfare and security.

"There was a time—in the 3-year period following the close of the war—when it became necessary to develop a substantial increase in imports, which had been at their all-time low during the war. This was necessitated by the sudden burden placed upon the oil industry by the enormously increased and wholly unexpected peacetime demand. Through its own efforts and in spite of critical shortages of essential materials, the industry has set a new all-time high performance in meeting that condition.

"There is, consequently, no longer any need or justification for continuation of imports at the very high level of recent months. In fact, the productive ability of the domestic industry will be seriously impaired and jeopardized unless there is a sharp and immediate reversal in the marked and alarming trend in imports.

"Imports of crude oil in 1948 were at the highest level of the last 30 years. They have increased by leaps and bounds in every year since the end of the war, and the upward pace has been accelerated at an alarming rate in the last few months.

"These recent developments, which have naturally been the cause of serious concern to the industry and to those government officials charged with the responsibility of maintaining a strong and healthy industry, have given a convincing demonstration of the soundness and wisdom of the National Petroleum Council's recommended national policy with respect to oil imports. That policy, developed by the council's national oil policy committee and unanimously adopted by the council itself, was primarily based upon a flexibility which called for adjustments in imports to meet changing conditions. It is clearly apparent that the time is now here to implement that policy by realistic downward adjustment.

"Leading importers are already moving in this direction. Substantial reductions have been ordered, and it has been announced that further reductions of imports will be made. Although it will necessarily require several weeks for this new policy to be reflected in any tangible way, I am confident that when this program is fully implemented, it will restore a sound balance and dissipate many of the fears within the industry, which have been reflected in a sharp decline in drilling activities.

"The extent of this decline in the first 5 weeks of the current year has been alarming in its implications with respect to national security. It must not be forgotten that in any national crisis the country's safety depends upon an adequate supply of petroleum here at home. Al-

*(Continued on page 137)*

## I. P. A. A. GROUP PLANNING FIGHT ON IMPORTS

*Members of the import policy committee of the Independent Petroleum Association of America and some guests meeting in the Washington offices of the association to push forward the I.P.A.A.'s case against excessive imports of petroleum. Seen in this picture are Wirt Franklin, Ardmore, Okla.; J. P. Coleman, Wichita Falls, Tex.; Walker T. Pound, state conservation officer, Oklahoma City; George F. Martin, Tulsa; B. A. Hardey, Shreveport, La.; William Helis, Jr., New Orleans; James A. Upham, Mount Vernon, Ohio; Charles H. Murphy, Jr., El Dorado, Ark.; Merle Becker, St. Louis; Clarence T. Smith, Flora, Ill.; Bryan W. Payne, Tyler, Tex.; Walter Priddy, Tyler, Tex.; Don Andrus, Bradford, Pa.; James V. Brown, National Petroleum Council, Washington; Rush Blodget, Los Angeles; L. Dan Jones, I.P.A.A., Washington; Warwick M. Downing, Denver; I. W. Hartman, Mount Pleasant, Mich.; James P. Evans, Jr., Jackson, Miss.; J. P. Jones, Jr., Bradford, Pa.; Minor S. Jameson, I.P.A.A., Washington; C. E. Buchner, I.P.A.A., Tulsa; Russell B. Brown, I.P.A.A., Washington; H. B. Fell, Ardmore, Okla.; Fred Shield, San Antonio, Tex., I.P.A.A. president; Charles Van Vleck, Tulsa*

# Shortage of Storage a Factor in Current Oil Adjustment Problems

***by Charles J. Deegan***

QUESTIONS are being raised today as to whether the industry has sufficient storage capacity to handle fluctuations in the postwar demands which are so much larger than prewar. As far as the current situation is concerned, these questions are academic. The industry has been running on short rations of steel since 1942, and has had to meet emergency problems first. If the desperate need for steel for wells, pipe lines, refineries, and tankers, eases in 1949, individual refiners will undoubtedly survey their individual problems and decide whether or not they need additional tankage.

Currently the production of crude oil is being cut back sharply. It has to be cut back because there is simply no storage space above ground to handle additions to crude stocks. This comes about because of the teriffic pace the industry has been setting since the spring of 1948 to build up heating and fuel-oil stocks to meet the peak demand expected in the winter of 1948-49.

**Winter Drawdown Small**

As everyone knows, this program overshot the mark. Suddenly right in the middle of winter, the consumer was getting all the oil he wanted, yet these demands were scarcely making a dent in the stockpiles. The current output of the refineries was almost enough to take care of the peak demand. This, despite the fact that only a few weeks previously, government officials had still been making official statments about the probable oil shortage.

But the petroleum industry's operations are geared to a cycle of consumer demand that has a seasonal pattern. The peak demand period is November through February. In these months, gasoline demand falls off, but fuel-oil demands increase more than gasoline demand falls off. Then as warmer weather approaches, the demand for gasoline begins to pick up, until it reaches a peak in midsummer, about July and August. But meantime the demand for fuel oils falls off more rapidly than gasoline demand goes up.

In order to keep refining operations balanced at the most economical level for year-round operations; the industry operates something like this. Gasoline stocks and heating-fuel stocks are like opposite ends of a see-saw. When one goes down, the other goes up.

As the winter season approaches, the refiner's storage of gasoline is low, because he had drawn down on his tanks during the peak demand of the summer. Meantime he has been filling these tanks with the light heating oils and kerosine. So, when winter comes and the big demand is for heating and fuel oils, his storage tanks are ready to be tapped. As winter draws to a close and his light heating-oil tanks begin to empty, the refiner begins to fill them with gasoline. Then when warm weather comes and motorists begin to burn up more gasoline, the storage tanks are ready to supply the gasoline orders.

**Crude Storage Less Flexible**

By careful manipulation of the order in which products are stored in a given tank, gasoline, kerosine, and distillate heating oils, can be pumped into and drawn out of the same tank, without contamination, and without expensive steam cleaning of the tank.

When it comes to heavier fuel oil and crude oil, the refiner has a more difficult pattern. He can switch these tanks back and forth between residual fuel oil and crude oil, but the seasonal pattern for residual demand and the required crude stocks doesn't always mesh too closely. But to whatever extent he can balance these off, he cuts down his tankage investment.

In the winter of 1948-49, the teriffic drive to build up stocks was a little too successful. Suddenly in the peak demand season, tanks were filled and current output was so high that the heating and fuel-oil tanks were not being drawn down at anything like a normal seasonal pattern. Gasoline stocks were seasonably amply high, and at the rate they were piling up while the heating-oil tanks stayed full, the refineries would soon have to shut down completely for lack of any place to store their ouput. Residual fuel oil stocks were extremely high, and filling tanks that might have been used for crude-oil backlog at the refinery.

One by one each individual refiner faced a situation where he had two choices. He could shut his plant down completely for a while and work off his stocks rapidly, thus making room in his tanks to start operating his plant again on a normal cycle. Or, he could cut back on his crude runs to stills, so that his current refined product output was smaller than his shipments. This

*(Continued on page 136)*

## Louisiana Allowable Cut 20,000 Bbl. for March

LOUISIANA'S daily oil production allowable, which has been increasing steadily for nearly 3 years, will be reduced for March by 20,000 bbl., State Conservation Commissioner S. L. Digby has announced.

The March daily figure will be 534,000 bbl., compared with 554,000 bbl. in February, or back to the level of last August. The cut actually is equivalent to around 25,000 bbl. for old wells, Digby said, as 5,000 bbl. of the new figure is for new production.

While some of the cut will be made by assigning lower figures to fields which have not actually produced full allowables, he said, most of the reduction will be on the statewide depth bracket or on whole units.

The immediate reason for the reduction, Digby said, is the decrease in market demand, which, with sound conservation practices, is the basis for setting the state figure.

Factors back of the weakening market, he said, apparently include both importing of crude and reduced demands for fuel oil this winter because of mild weather on the eastern coast.

The Louisiana allowable figure has increased nearly every month for 34 months, starting with 398,022 bbl. in April 1946. Some neighboring states already have announced one or more similar cuts.

## Oklahoma Allowable Cut 22,339 Bbl. for March

Another cut in crude-oil production in Oklahoma was made when the state Corporation Commission approved a production recommendation for March of 388,811 bbl. The new allocation, a cut of 22,339 bbl., compares with 411,150 bbl. daily for February. In January the state produced 424,100 bbl. daily.

The March figure was recommended by Walker T. Pound, conservation director, who said a second reduction was necessary to halt increasing stocks and to aid in cutting back natural-gas flaring in some fields. Several landowners of Stephens County protested the reductions in the Velma and Sholem Alechem areas.

## New Mexico Allowable Is Reduced 2,000 Bbl. Daily

Daily allowable producion of crude oil in New Mexico has been set at 142,000 bbl. for March by the state proration commission, a reduction of 2,000 bbl. per day from the allowable for February. The allowable has been 144,000 bbl. per day for the past several months, though prior to last August it was 135,000 bbl. per day.

# this week

**PRORATION**—Oklahoma cuts allowables 22,339 bbl. for March. . . . Louisiana cuts 20,000 bbl. . . . Announcements follow Texas cutback of 200,000 bbl. . . . ¶Producers continue to attack imports as cause of reductions. . . . ¶Texas operators question wisdom of continuing straight MER proration method. . . . Suggest selective basis by fields. . . .

**IMPORTS**—Socony-Vacuum and Texaco say their imports not displacing domestic crude and their chief interest is in vigorous U. S. industry. . . . ¶Hallanan says excessive imports would injure domestic industry but predicts sharp decline. . . . Calls on importers to follow NPC policy. . . . ¶Congress and ECA begin studies of effect of European Recovery Program on domestic oil industry. . . .

**STORAGE**—Problem of adequate storage of crude and products becoming an issue in the industry. . . . ¶Some producers charge excessive stocks caused production cutbacks. . . . ¶Others in industry point out more storage needed for higher volume of business. . . . Say more refinery storage, particularly for products, would increase flexibility, permit absorption of local and seasonal demand fluctuations. . . .

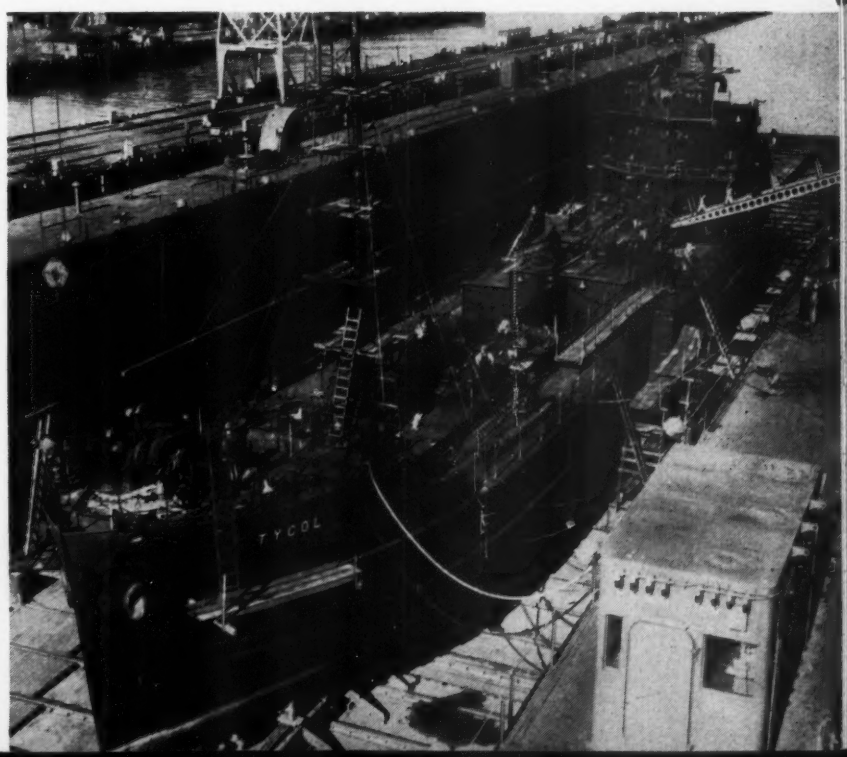
**TRENDS**—Crude production in U. S. for week ended February 26 averaged 5,331,150 bbl. daily, down 17,950 bbl. from previous week and 95,475 bbl. below same week last year. . . . ¶Gasoline stocks reached 122,533,000 bbl. on February 19, another all-time high. . . . Represents a gain of 18,470,000 bbl. since the first of the year compared with 15,787,000-bbl. gain for the same period last year. . . . Illinois-Indiana area accounted for 33 per cent of this year's increase. . . . ¶Clean product stocks decreased 4,400,000 bbl. since January 1 compared with decline of 6,400,000 bbl. for same weeks last year. . . . ¶Generally soft tone continues in all products markets. . . . Natural-gasoline prices fall another cent to 6 cents Group 3 for 26-70 product. . . . No. 6 experiencing softest market in decade. . . .

**INTERNATIONAL**—Tapline project gets 25,000 tons of pipe as exports are resumed. . . . ¶Engineering work now under way for construction of Brazil's first petroleum pipe line. . . . ¶Australia to see deep drilling operations soon. . . . ¶Stringent regulations and control hamper Egyptian oil development. . . . ¶Pemex head visiting Washington exploring possibilibilities for loan. . . . ¶ECA will finance oil exploration in British African colonies. . . .

**PIPE LINES**—Pacific Gas & Electric preparing for construction on 510-mile, 30 or 34-in. Topock, Ariz.-Milpitas, Calif., line. . . . Actual start contingent on several factors. . . . ¶El Paso Natural Gas Co. will spend $95,000,000 in 1949-50 on facilities increasing deliveries to California. . . . Included will be 450 miles of 30-in. line. . . . ¶Keystone Pipe Line installs radiotelephone system for communication. . . . ¶Texas Eastern gets approval from Federal Power Commission for increase of 75,000,000 cu. ft. of gas daily through Big and Little Inch pipe lines. . . .

**REFINING**—Shell Oil to explore fluid-power uses at new hydraulic-fluid laboratory recently opened at Wood River, Ill., refinery. . . . ¶Automatic desulfo plant to be built for Panhandle Producing Co. by Dresser Industries near Stinnett, Tex. . . . ¶U. S. patents covering I. G. Farbenindustrie A.G., refining inventions available. . . .

**NATURAL GAS**—General counsel for Fuels Research Council assails Texas Eastern Transmission Corp.'s proposal for increase in Big and Little Inch pipe line throughput, which Federal Power Commission has approved. . . .




*Cut apart amidships, this surplus government coastal tanker had a 3,000-bbl., 30-ft. tank inserted in course of conversion for Tide Water Associated Oil Co. The vessel now has a length of 250 ft., deadweight tonnage of 3,259, and capacity of 15,000 bbl. A single-screw diesel engine drives her at a speed of 10 knots. Renamed "Tycol," the tanker will distribute products from Tide Water's Bayonne refinery to terminals along the Hudson River and Long Island Sound*

# ECA Calls for Study of Effects of Middle East Oil Imports on U. S.

WASHINGTON.—The Economic Cooperation Administration plans to call in a group of outstanding citizens to study the effect of increased imports of Middle East oil on the domestic industry and their relation to the operation of the European Recovery Program, it was disclosed this week.

While ECA's interest in the matter centers in the effect it may have on the prices paid by the Marshall plan countries for oil, its investigation, undertaken before congressional committees, were advised of the situation during the course of their hearings on continuation of the ERP, may serve to clarify the situation which led to cutbacks of some 500,000 bbl. daily in production allowables in Texas, Oklahoma, and Kansas.

### Import Companies Questioned

In material submitted to the Senate foreign relations committee to supplement his testimony last week, which will be followed by a somewhat similar statement to the House foreign affairs committee this week, Economic Cooperation Administrator Paul G. Hoffman disclosed that he had taken the question of imports up with the major importing companies as far back as last December 3 and had sent them another letter on the subject February 14.

In his later letter, Hoffman referred to the increasing volume of imports of Middle East oil, and told the companies that "having continued over so long a period, the question arises as to whether this movement can be regarded as temporary or sporadic.

"In volume as well as in duration this movement is significant for it appears that these imports of Middle East crude oil into the Western Hemisphere have exceeded Western Hemisphere exports of crude oil to the Eastern Hemisphere during the same period. Consequently, the prices charged on such sales have an important bearing on the determination of the competitive market price at Middle East shipping points."

Hoffman referred to official statistics indicating that prices for Middle East oil to the United States have ranged from about $1 to $1.75 per bbl., while at the same time $2.03 per bbl. has been charged for similar oil to ECA destinations. He pointed out that the price of Saudi Arabian crude of 34° (A.P.I.) dropped from $2.18 to $2.03 per bbl., f.o.b. Ras Tanura, last year "as a result of competitive forces operating in the industry when Western Europe was apparently the important marginal market for Middle East crude oil."

"Since the Western Hemisphere was apparently the important marginal market for such oil during the last half of 1948, it is to be expected that a further decline would have resulted in line with the price trend on sales to the Western Hemisphere," he said.

"Serious questions are thus presented as to whether prices charged on sales of Middle East crude oil to ECA destinations during the period under consideration reflect competitive market conditions in the Middle East and whether sales so priced are satisfactory for financing by this administration."

Hoffman also sent to the committee copies of replies from W. L. Faust, vice president of Socony-Vacuum Oil Co., Inc., and Eugene Holman, president of Standard Oil Co. (N. J.).

Faust explained that the recent import movement is the result of "a combination of unusual circumstances which are not likely to continue," and said that the values shown on shippers' declarations did not represent his company's selling prices. In fact, he said, Socony-Vacuum imported only for its own purposes and has sold none of the crude brought in and "would not consider selling our Middle Eastern crude at prices corresponding to the valuation you mentioned."

### Freight Charges Absorbed

Holman explained that although the price of $1.99 per bbl. for Middle East crude sold to Europe is substantially less than the price of comparable U. S. crudes, it is not sufficiently lower to overcome the higher freight to this country plus the import duty, and in order to give imported oil a delivered price at the refinery comparable with the cost of domestic crude, "substantial freight charges had, in effect, to be absorbed through a lower intercompany f.o.b. price for these shipments than the $1.99 price." The company's ultimate plans for Middle East crude, he said, do not take into account any such imports on a permanent basis. Imports, which reached a high of some 90,000 bbl. daily during the last quarter of 1948, will be reduced to 50,000 bbl. for the current quarter and will be further cut to 35,000 bbl. in the second quarter, he added.

In the material filed with the committee, Hoffman pointed out that the Foreign Aid Appropriation Act requires that prices paid for offshore purchases shall not exceed the United States market price but, he added, while ECA has no intention of undertaking price control, it has consistently insisted that prices charged on ECA financed transactions should fully reflect competitive conditions affecting the market at the source of the commodity, and the requirement was to be considered merely as a ceiling over, not a floor under, prices.

This position was laid before the companies early last year and their cooperation was secured with the result, it was said, that "many millions of dollars" of the taxpayers' funds have been saved in the financing of 8,119,000 bbl. of Middle East crude up to November 23, last, which cost $17,643,000, exclusive of ocean freight.

## A.P.I. Picks Chicago and Los Angeles for Meetings

Chicago again has been named as the site for the twenty-ninth annual meeting of the American Petroleum Institute to be held November 7-10.

Besides naming the date and site for the 1949 meeting the board of directors at a recent meeting in San Francisco selected Los Angeles for the 1950 gathering scheduled to be held November 13-16.

The meeting in 1950 will be the first West Coast meeting of the A.P.I. since 1941 when it was held in San Francisco. Los Angeles was the site for the 1935 meeting. Since 1942 the organization's annual meetings have been in Chicago with the exception of 1944 when no meeting was held because of the wartime transportation difficulties.

## FCC Assigns Frequency To Exploration Companies

WASHINGTON.—The Federal Communications Commission has authorized Seismograph Service Corp. and Frost Geophysical Corp., both of Tulsa, to operate not to exceed four radiolocation stations each in the frequency band between 1,750 and 1,800 kc. on a temporary basis, and has ordered an investigation into the necessity for and frequency location of such service on a permanent basis.

The temporary band is used also for disaster communications and in the view of three commissioners is unsuitable for permanent use. The two companies originally requested frequencies in the range of 1,600-2,500 kc., for operations in the Gulf of Mexico, and it was recommended in a proposed report last September that they be given channels ranging from 2,000 to 2,050 kc.

# Socony-Vacuum Says Its Imports Not Competing With U. S. Crude

NEW YORK.—G. V. Holton, chairman of the board of Socony-Vacuum Oil Co., Inc., has told the governors of Texas and Oklahoma that the company's imports of crude oil have been relatively small in amount and made for the purpose of supplementing domestic supplies for its Eastern Seabord refineries.

Holton's comments were in letters to Gov. Beauford H. Jester of Texas and Gov. Roy J. Turner of Oklahoma. The two governors earlier had written separate letters to Socony-Vacuum and several other large companies protesting that crude imports had forced cutbacks in domestic production and were creating a crisis in their states.

In his letter to Governor Jester, Holton pointed out Socony-Vacuum had a large investment in Texas through Magnolia Petroleum Co. and said, "we are, within the limitation of our pocketbook, most active in our endeavors to discover and develop crude reserves within the United States, particularly Texas."

### None Brought to Texas

Holton said Socony-Vacuum had brought no foreign crude into Texas other than a small amount for testing. He also told the Texas governor the company's production is quite inadequate for requirements, and that insufficient domestic crude at posted prices has been found to make desired runs at Magnolia's Beaumont refinery.

"We understand that there is an excess of crude in certain areas of Texas due primarily to a lack of adequate transportation," Holton said. "We understand further than this situation is on the way to being alleviated by additional pipe lines. Magnolia is actively participating in some of these ventures.

"Our company in common with many others has in the past been urged by the federal Government to develop foreign production for the purpose of national defense, conserving natural resources, and stimulating foreign trade. We have also been urged to take steps necessary to help meet consumer demand for petroleum products."

### Beaumont Refinery Short

The Oklahoma governor also was told of Magnolia's investments in the southwest and the unavailability of sufficient crude for Beaumont. Holton wrote Turner: "It seems to us that some well-intentioned people may have exaggerated the seriousness of the problem you have referred to. We believe the solution of this problem can best be found in the normal operation of economic forces.

"There is one point in particular I would like to call to your attention because I think it may have received too little emphasis. There has been a lag in the construction of refining facilities in the Eastern Hemisphere, the natural market for foreign crude which has recently been coming into this country. As a result the crude has been processed here and the products exported. We think it is reasonable to suppose that this is a temporary situation and that as refineries are completed abroad the crude will be refined and distributed there. According to information given me, exports of products exceeded by a considerable margin net imports of crude."

Holton's letters were made public over the week end by the company. Standard Oil Co. (N.J.) earlier released correspondence on the same subject between Governor Jester and Eugene Holman, Jersey president.

# Texas Co. Also Denies Charges That Imports Favored Over Domestic Crude

NEW YORK.—The Texas Co. depends on domestic crude as its chief source of supply in the United States and looks on South America as the proper supplement to domestic production, H. T. Klein, Texaco president, has written Beauford H. Jester, governor of Texas.

Klein's letter, made public by the company, was in reply to the protest made by Governor Jester to The Texas Co. and several other large operators against foreign oil imports which he said were seriously endangering the state's economic well-being.

Klein wrote: "We feel that Middle East crude will find its principal markets in the Eastern Hemisphere. As you know, we have, through subsidiary and affiliated companies, production in both South America and the Middle East. Approximately 98 per cent of our total supply of crude during 1948 came from domestic sources. Of the small amount of crude which was imported by The Texas Co., less than one-half of 1 per cent came from the Middle East."

The Texas Co. president pointed out that the company at this time is constructing pipe lines from West Texas to Illinois which he said should eliminate to a large extent the shortage of transportation which has resulted in the curtailment of some West Texas production.

The Texas Co., Klein wrote, is aware of the fact that "the prosperity of the industry is contingent upon the prosperity of Texas and the country." A great many of the company employes live in Texas, and a large proportion of the company's total investment is in the state, he said.

The Texas Co.'s imports of Middle East oil in 1948 totaled less than 500,000 bbl., and from other sources it was reported that the company's schedule for 1949 calls for discontinuing these movements entirely.

## "Oil Progress Week" Set For Third Week in October

During the third week in October the oil industry will again celebrate "Oil Progress Week," according to an announcement made by the Oil Industry Information Committee. As was the case with "Oil Progress Day" last year, emphasis of the celebration will be placed on having local oil men present the industry's story to their own communities. This method of operation was responsible for much of the success of the 1948 program.

Theme for the coming celebration will be "Ninety Years of Progress" in commemoration of the ninetieth anniversary of the drilling of the Drake well.

Objectives of the program will be to explain to the public how it benefits from the industry's constant and extensive research, improved products and services, and the industry's widespread system of local distribution. Other goals will be shown the nation how the keen competition in the industry benefits customers, how the oil companies increase petroleum reserves through exploration and conservation, and the advantages of using petroleum products efficiently.

## Church Buys Moran Ranch

HOUSTON.—"Mo-Ranch," the 6,816-acre property of the late Dan Moran, former president of the Continental Oil Co., has been sold to the Synod of Texas of the Presbyterian Church for over $500,000.

# International

WORLD-WIDE OIL DEVELOPMENTS

# Tapline Project Gets 25,000 Tons Of Pipe as Exports Are Resumed

A 10-MONTH suspension of licensing of pipe exports for the trans-Arabian pipe line terminated last week when Secretary of Commerce Charles Sawyer announced the approval of a permit for the export this quarter of 25,000 tons of 30-in. steel pipe.

Decision to resume licensing, which was suspended last April, Sawyer said, "primarily because of disturbed conditions in the Middle East," appeared to be tied in with acceptance by Arabian American Oil Co. of a proposal by the secretary that the transportation saving upon completion of the line be shared with the Government.

Negotiations to that end were undertaken last November and concluded February 18 with agreement by the company "to transport for the National Military Establishment, at cost, substantial quantities of oil from the Persian Gulf to the Mediterranean, for a period of 10 years after completion of the pipe line," Sawyer said.

Sawyer estimated the saving to the Government over the 10-year period would average more than $2,000,000 a year.

Another important factor leading to the decision to let Trans-Arabian Pipe Line Co. ship pipe, Sawyer said, was the fact its operations had reached a point where failure to provide pipe would necessitate dispersing the field crews.

With the 25,000 tons authorized for this quarter, the company will have shipped about 79,000 of the 260,000 tons of line pipe required for the 1,067-mile line for which all negotiations except the Syrian transit right have been concluded.

During the period when no licenses were issued, Sawyer said, the company released some 65,000 tons of pipe to domestic natural-gas pipe lines but was able to develop an inventory of some 50,000 to 60,000 tons. This will leave the company with 25,000 to 35,000 tons, which Sawyer indicated would be the extent of the second-quarter license, since all of the output of the pipe manufacturer, Consolidated Steel Corp., until the end of June and possibly longer will be made available for domestic use.

Sawyer emphasized that the department has made no commitment beyond the present quarter, but said he expects it will continue to issue licenses.

The secretary said that the licensing of the pipe will not deprive any other area of needed supplies. Domestic consumers have said they did not want the pipe in Aramco's inventory, and there are no export applications pending for that size pipe from Latin America or other oil-producing areas.

Sawyer explained that all of the agencies interested in the trans-Arabian line—the Military Establishment, Interior and State departments, and Economic Cooperation Administration—recommended last fall that licensing of exports be resumed, but action was deferred pending the completion of a thorough study by the Commerce Department.

"It was clear from this study that construction of the pipe line, which is being financed entirely by capital supplied by private American firms, would facilitate the development of the petroleum resources of the Middle East, and raise the level of economic activity in that area," he said.

The study also showed, he added, that despite sharp increases in steel production in the United States, line pipe is still in seriously short supply in this country, and it was a combination of that shortage and the military requirements for oil in the Mediterranean area that led to his suggestion that, when completed, the line should carry oil purchased by the Navy at actual cost of transportation, on a formula now being worked out.

Estimates last week were that it would take about a month to assemble the necessary shipping to move the pipe from the California mill. The haul from the West Coast to the Persian Gulf requires an additional 5 weeks.

Work on the line was brought practically to a halt recently when the last of the 238 miles of pipe shipped prior to last July 1 was strung and welded. The 25,000 tons licensed for export last week for first-quarter shipment, represents the total amount requested by the company for the quarter. With about 240 tons per mile required, the new allocation will provide pipe for 104 miles further on the line.

### Transit Agreement Expected

The difficulties encountered by the $200,000,000 project appear to be clearing up quickly after the discouraging and expensive delays. Reports are the Syrian Parliament will take action early in March on the transit agreement through that country.

Reports from Damascus last week said that terms of the 70-year concession for the right-of-way were being circulated among the deputies of the Syrian Parliament in preparation for ratification. A government statement introducing the bill said the company would spend more than $40,000,000 annually, surrendering 80 per cent of this to the Syrian foreign exchange controller.

Twopence per ton (about 3.5 cents) for oil exported will be paid in equal shares to Syria and Lebanon. Two hundred thousand tons of crude annually at a competitive world price will be sold to Syria if demand requires, and if refineries are built prices of fuel oil sold to Syria will be competitive.

The $40,000,000 includes a minimum of 40,000 pounds (about $160,000) protection dues, and should oil be found in Syria, Tapline will not refuse to use its transport means to a Mediterranean port. One of the five annexes stipulates the right of Syria to demand payment in dollars in place of sterling at the official rate.

Approval of the Syrian agreement and resumption of the pipe shipments may lead to work on the line from both ends as originally planned. All work thus far has been in Saudi Arabia.

# Brazil's First Pipe Line Will Climb to Sao Paulo on Plateau

ENGINEERING work is now under way for the construction of Brazil's first petroleum pipe line, a 30-mile project which will move products from the seacoast inland to the Sao Paulo industrial area.

Actual construction is scheduled to get under way early next year. The project consists of two parallel lines, one 10-in. for clear products, motor fuel, kerosine, and light distillates, and the second 18-in. for heavy fuel oil.

The line will be built by Estrada de Ferro Santos a Jundiai, the government-owned railroad. Its initial point will be at Alemoa on the outskirts of Santos.

The over-all project contemplates the construction of two submarine lines, probably 10-in. and about 2 miles in length, which will link Alemoa with Barnabe Island offshore. This phase of the work will be under Cia. Docas de Santos, a company which now has some 1,250,000 bbl. of existing storage on Barnabe Island.

**Project Rivals Steep Inch**

The pipe-line project itself rivals the so-called Steep Inch now being built by Creole Petroleum Co. from Catia de la Mar to Caracas in Venezuela. The two Brazilian lines extend northwest across the coastal plain for about 8 miles to Cubatao. Here the lines ascend to the mountain plateau, going up nearly 2,500 ft. in about 1½ miles. The remaining distance to Sao Paulo is across rolling hilly country.

Plans call for the construction of a terminal at Sao Paulo to serve existing oil-company distribution facilities. Sao Paulo, with a population approaching 1,000,000, is Brazil's second city.

One pump station providing a pressure of 1,200 psi. is to be built at Alemoa for the clear-products line. Two stations, with pressure of about 1,400 psi., are planned for the fuel-oil line, one at Alemoa and a second at the top of the mountainous rise about 10 miles from Alemoa.

The two pipe lines will have a throughput of about 45,000 bbl. daily each. Market demand in the Sao Paulo area is now about 24,000 bbl. for both types of products, and the excess capacity is being provided to meet the expanding needs of the fast-growing area and also to give flexibility in unloading and movement.

Completion of the pipe lines will release needed capacity on the existing railroad on which about 30 per cent of shipments are petroleum products. Supplementary supplies are at present moved by truck. The distance from Santos to Sao Paulo by highway is about 43 miles, and by railroad, about 46 miles.

The project was designed by William J. Heltzel, Tulsa, consulting engineer, with Williams Brothers Co. doing the engineering. Leopoldo Miguez de Mello, first assistant to Gen. Joao Carlos Barreto, president of Brazil's Conselho Nacional do Petroleo (National Petroleum Council), is now in New York at the temporary headquarters at 70 West Fifty-fifth Street assisting in the planning work.

**New Line Planned**

Another pipe line is to be built in Brazil for use in connection with the 2,500-bbl. daily refinery which M. W. Kellogg Co. is constructing for the Conselho Nacional do Petroleo near Bahia. This line, about 2½ miles long, will be built by the Brazilian organization and will move crude from Candeias field to the refinery.

About 2,000 bbl. daily of the crude for the refinery will be taken from Candeias field. The remainder is to be barged across from Itaparica field which is located on an island in All Saints' Bay.

Discussions are continuing for the construction of possibly three other refineries in Brazil. Location has not yet been determined for the 45,000-bbl. daily refinery which Conselho Nacional do Petroleo is to erect. This refinery will operate on imported crude, and some of Brazil's French currency credits may be used to obtain equipment in France. In addition to this project, private concessions are held for a 10,000-bbl. daily refinery at Rio de Janeiro and a 20,000-bbl. daily plant at Sao Paulo.

## Jersey Affiliate Suspends Operations in Egypt

Standard Oil Co. of Egypt, Standard Oil Co. (N.J.) affiliate, has suspened operations pending clarification by the Egyptian Government of its oil policy as set out in the Mines and Quarries Law.

The suspension of operations, which was described as temporary, was first made known in reports from Cairo and later confirmed by A. L. Owens, general manager of Standard of Egypt, in Cairo.

Owens said the company had sent home about one-third of its small American staff and had released a considerable number of its Egyptian employes until the terms of the licenses and leases to be granted under the law were clarified.

The Cairo reports discussed Egypt's prohibition against exporting crude oil in connection with the suspension of operations of Standard of Egypt. Egypt also has decided on similar policies in other fields, designed to force the use of raw materials such as iron ore and cotton within the country. *(For further details pertaining to government regulations in Egypt see page 44, this issue).*

## Deep Drilling Scheduled Soon for Australia

THE oil exploration campaign under way in Australia will receive new impetus in the next few months when Australian Shell Oil Co. begins deep drilling operations in central Queensland.

I. Luxton, general manager of the company in Melbourne, said, "we think it is worth a million pounds to find out if there is oil in Queensland, and we believe there is a reasonable chance."

The work is being carried on with the assistance of the commonwealth government in the Roma, Emerald, Longreach, and Charleville areas. Dr. H. G. Raggatt, director of the commonwealth Mineral Resources Bureau, said the bureau also is interested in prospects in an area in Western Australia's Kimberly Basin.

The bureau director pointed out the most promising prospects for oil development on Australian territory are in Papua on the island of New Guinea. Australasian Petroleum Co. expects to have three heavy rigs drilling northwest of Port Moresby in the near future.

## Exploration Rights Sought In British Guiana

Two unidentified United States companies are negotiating for oil exploration rights in 30,000 sq. miles of British Guiana, according to reports from Georgetown, the capital.

The areas involved are the Berbice and Essequibo. One company is seeking permission to investigate 15,000 sq. miles in the northwestern district adjoining Venezuela and in the Berbice area.

*A seismograph camp at Wadi Dara on the west side of the Gulf of Suez between Ras Gharib and Hurghada*

# Stringent Regulations and Control Hamper Egyptian Oil Development

**by Dahl M. Duff**

International

**This is the second and concluding article on Egyptian oil development. The author explains in this article the stringent requirements and regulations that oil companies face in taking part in the search and production of oil in the Egyptian fields.**

THE three companies—Socony-Vacuum Oil Co., Inc., Anglo-Egyptian Oilfields, Ltd., (Shell controlled) and Standard Oil Co. of Egypt, affiliate of Standard Oil Co. (N.J.)—have applied for between 2,500,000 and 3,000,000 acres in exploration permits under the new legislation. The only two areas which have been confirmed as leases are Asl and Sudr. Both are in the name of Anglo-Egyptian. Terms of these leases provide for a 15 per cent royalty to the government plus the right for the latter to purchase 20 per cent of the production.

These lease agreements predate the present Mines and Quarries Law which was passed by the Parliament last July. General terms set out in this legislation applying to petroleum operations are stringent, and the recent regulations set up under the law to govern the issuance of exploration permits and leases are considered unfavorable.

The petroleum prospecting license proposed by the government as well as the law itself specify that any lease taken on an area found to be productive will be issued only to a Societe Anonyme Egyptienne, formed or under formation. Of the three major companies presently operating in Egypt, only one is said to meet this legal requirement.

Egypt has given clear indication that future refining in the country will be only in plants owned outright by the government or by a majority of Egyptian nationals. In this connection, the dominant political party of Premier Abdul Hadi Pasha went on record late in January in favor of the nationalization of refineries with exports permitted for products only after local requirements are met. This is regarded as now the official policy.

The government refused to approve proposed expansion plans of Anglo-Egyptian for its Suez refinery unless the company would allow the government a 51 per cent interest in the plant as a whole or a 51 per cent share in the expansion. On the other hand, the government has announced plans to increase capacity of its own refinery up to 20,000-bbl. daily over a period of 15 months to 2 years.

This government objective of national refining is backed up by provisions in the new lease form which say that all oil produced shall be refined in plants existing in Egypt and owned by Egyptian companies or by the Egyptian government. Export of crude oil is prohibited except in very exceptional cases and under certain conditions to be laid down by the Department of Mines and Quarries.

The Department of Mines and Quarries is the regulatory agency, and the lease also provides that the lessee will follow the department's orders regarding fixing of prices and specifications for products offered for local consumption. If the crude is sold to another party, the lessee is required to obtain guarantees that the conditions of refining and sale laid down by the government will be met.

The government gives itself the right to buy 20 per cent of all crude produced or of the products refined from the crude. The price to be paid by the government is fixed at 10 per cent under that of the recognized world market. If the government wishes to buy products instead of crude within the 20 per cent limit, the lessee is obliged to deliver products even though he does not operate a refinery in Egypt.

The proposed prospecting license, or exploration permit, provides for separate rectangular areas up to 10,000 hectares. The fee is 10 Egyptian pounds the first year (one Egyptian pound is currently quoted at about $4.15), 100 pounds the second year, and 2,500 pounds annually thereafter. As a further means of forcing drilling, the license will not be renewed after the third year unless a rig is kept in continuous operation on the area. This rig must, in the opinion of the department, be capable of reaching the deepest strata.

Tight control of operations by the government is provided during all phases of the work. Frequent reports of geological and geophysical work are required. Exploration blocks must be completely surveyed and a report made in 60 days. All operations such as well location, acidizing, use of explosives, pulling of casing, and abandonment, must be approved beforehand by the government. The technical qualifications of the company manager and his assistant must satisfy the government.

Another specification of the regu-

*The Asl field area looking south to the site of a wildcat drilling in the Nebwi block*

lations forbids any transfer or assignment of a license. This means that a company cannot dispose of its interest to a partner.

Up to half of the exploration area may be converted to a 30-year lease. Minimum rental is 25,000 Egyptian pounds a year. This provides a guaranteed royalty of this amount. The government's royalty on the production is 15 per cent, plus the 20 per cent purchase option. The lessee has a priority to buy a lease on the remaining half of the block, but here a royalty of 25 per cent is specified.

Like the exploration permit, the lease sets out numerous conditions and restrictions for ordinary company operations. Dual completions, for example, are prohibited without the department's consent. Managers also must be approved, and leases cannot be assigned without permission. Authority over all types of operations are vested in the department.

One especially burdensome requirement calls for the continuous operation of at least one rig in the lease area for a period of 20 years unless production amounts to 100,000 tons a year at a rate of 1,000 tons for each square kilometer.

In a national emergency, the government can requisition the entire field, paying compensation in the manner stipulated by law. Similar steps are authorized if the lessee limits production to cause deficit in supplies for local consumption. Rate of production under ordinary conditions is to be controlled by the government. Any pipe lines laid across the desert can transport oil other than the lessee's own production only with government permission, and the government's royalty or purchase option oil is to be moved free of charge.

At the end of the 30-year term of the lease and with 3 years' notice to the government, the lease can be renewed for an additional 15 years but the royalty increases to 25 per cent. This royalty increase is agreed on at the time of original lease. No property can be moved, sold, or assigned during the last 3 years of the lease without government approval.

## International

WORLD-WIDE OIL DEVELOPMENTS

At the same time the Egyptian Mines and Quarries Department is offering these almost prohibitive contracts to the industry, the Ministry of Commerce and Industry is attempting to interest companies producing in Saudi Arabia to carry their Mediterranean pipe line to Suez or some other Egyptian port. A new refinery dominantly Egyptian owned but with a minority of American capital also has been suggested. There also has been some discussion that a crude-oil pipe line might be extended from the new Egyptian fields to the Mediterranean, but with crude export presumably to be prohibited, this appears highly unlikely.

*Hamra 1, one of several wildcats drilled by Socony-Vacuum in the area a short distance north of Sudr field*

# Head of Pemex Visits Washington To Discuss Prospects for Loan

***by Bertram F. Linz***

WASHINGTON. — Possibilities of a loan to Mexico of anywhere up to $500,000,000 for expansion of its oil industry reportedly will be explored by Antonio Bermudez, general manager of Petroleos Mexicanos, who is here to confer with Washington officials this week, but there is no indication that the Export-Import Bank, through which the money would be advanced, would depart from the policy set forth in the loan to Bolivia that all activities be conducted under American supervision, or that the Mexican government would abandon its opposition to such an arrangement.

Meanwhile, another installment of the approximately $8,000,000 which the bank is advancing to Bolivia is being held up pending receipt from Hoover, Curtice & Ruby of a report on the prospects of the area in which new development is proposed.

Bermudez came to Washington at the invitation of Chairman Robert Crosser of the House interstate commerce committee, who visited Mexico last year as a guest of President Aleman. While in Washington for discussions with committee members, Bermudez is expected also to talk with State Department and possibly other officials.

**Committee Favored Loan**

Several members of the committee went to Mexico during the summer and later the then chairman Charles A. Wolverton wrote a report on Mexican oil which was highly commendatory of Pemex and suggested the possibility of a loan, which he said might be administered by a joint commission representing both governments, an arrangement to which Pemex is entirely agreeable.

Wolverton reported that a 5-year development plan presented to the committee by Bermudez was designed to increase Mexican production from 167,000 to 365,000 bbl. daily at a cost of $470,000,000, of which $130,000,000 would be for geologic and geophysical activities and exploration drilling, $240,000,000 for exploitation, $46,000,000 for pipe lines, and $32,000,000 for refineries.

Toward the end of last year, Crosser, who had not accompanied the party, went to Mexico as a guest of the government, traveling in President Aleman's private plane. Since his return, Crosser has not said definitely how he views a loan to Pemex.

Over a year ago Bermudez had conversations with several oil companies in an effort to make an arrangement whereby they would get into Mexican production, and when the House committee was in Mexico he presented a new proposal. The original offer would have compensated the companies by giving them 80 per cent of the gross production, less pro rata expenses, until their investment had been amortized, thereafter 20 per cent, less pro rata expenses, during the balance of the agreement. The new offer would give the companies greater freedom in deciding where they would operate and would reimburse them for capital expenditure out of 50 per cent of the gross production with no deduction for expenses and compensate them for their efforts and risk out of 13½ per cent of the gross production, without deduction for expenses, net over all taxes, and any other charges.

It was indicated in Washington that any change in the policy of the Export-Import Bank, which is based on State Department views, was unlikely, but in some quarters it was suggested that if Pemex could develop a mutually satisfactory basis for dealing with the companies it might improve Mexico's chances of securing a loan. On the whole, the Government's attitude has been that foreign oil development could readily be financed by the American companies if given a favorable political climate to operate in; but in view of the magnitude of the Mexican program it is possible the Government might be willing to aid in the financing.

# ECA Will Finance Oil Exploration in Africa

WASHINGTON.—The Economic Cooperation Administration has agreed to a proposal by the British Government to finance a search for oil and other underground resources in Africa.

Geological and topographical surveys of Britain's African colonies were undertaken in 1946 but have been progressing slowly because of the shortage of trained personnel.

To speed up the work, some 60 geologists, chemist-assayers, and topographical engineers, including three petrologists, will be recruited for two projects. The petrologists will be assigned for a 3-year survey in Nigeria, the Gold Coast, Sierra Leone, Uganda, Kenya, Tanganyika, Borneo, and British Guiana, where oil and a number of important minerals already are produced or are known to exist.

The ECA has earmarked $1,500,000 for the salaries of the experts, to be over and above the amount allotted the United Kingdom for procurement of commodities under the European Recovery Program, and has agreed to the release of approximately $1,680,000 from Britain's counterpart funds to pay the sterling expense involved in the program.

The recruiting for the exploration will be handled by the Geological Survey as agent for the ECA, but since the number of qualified persons available is limited it is not yet known whether the full complement of experts sought can be provided.

## Easing of Tight Supply In Steel Goods Is Seen

WASHINGTON. — The Commerce Department's steel products advisory committee met last week to discuss voluntary allocation programs, and for the first time in many months the Interior Department did not press for an agreement on oil-country tubular goods.

The two agreements which have been sought by the department on tubular goods and line pipe were not discussed, it was said by Commerce Secretary Charles Sawyer following the meeting.

Sawyer suggested that the urgency of the two programs may have eased as a result of good indications that the steel industry this year will be able to meet the highest goals that have been set on oil-country tubular goods and is rapidly narrowing the gap between supply and demand of line pipe.

While the committee took no action on these matters it did agree to a program urged by the Economic Cooperation Administration to supply steel plate for ship building in the Marshall plan countries, adopting a program to furnish 54,544 tons of plate to Norway over the next few months for tanker construction and 12,500 tons to Denmark and 8,500 tons to Sweden. All three countries had asked for larger amounts.

## Pressure Program Asked For San Pablo Field

AUSTIN. — The Texas Railroad Commission scheduled a hearing on March 29 on the application of Baldridge & King, McAllen, Tex., to initiate a pressure maintenance project in San Pablo field, Jim Hogg County.

# WASHINGTON WATCHING

BY BERTRAM F. LINZ

## Truman's 5-Year Plan

WASHINGTON.—The difference between Russia and the United States is that in the Red heaven Stalin announces a 5-year plan and starry-eyed Communists break their necks to carry it out, while here President Truman proposes one and Congress doesn't cheer.

In fact, it took considerable work even to get the "Economic Stability Act of 1949" into the congressional mill and Rep. Brent Spence of Kentucky introduced it only after a number of other members in House and Senate had declined the honor.

The bill was introduced February 15. Nine days later, in his Jackson Day address, the President charged that the "special interests" were sabotoging his program to aid business in increasing production and threatened to make another barnstorming trip cross-country to tell the people how their government is getting on. That threat made a hit with the $100-a-plate diners whom he addressed, but evoked no applause from Democrats in Congress.

Even before Spence's banking and currency committee had prepared to consider the measure, the opposition began to pile up and what has been said about the legislation in communications received by the committee is forceful if not complimentary.

About the best that has been said about it by its opponents is that it attacks a lot of things the President doesn't like, which he has dignified by such terms as "maldistribution," "maladjustments," and the like, without providing any definition of those terms, setting up any standards to be followed or imposing any limitations on the President's power.

A careful reading of the bill will show that the President need find only a "threat" of shortage to invoke the whole machinery of the legislation, and he would have many willing helpers to find "threats."

## Expensive Figures

IT takes about 10,500 government workers in some 50 different civilian agencies and cost about $43,000,000 a year nowadays just to gather statistics which often aren't too good once they are gathered, it has been disclosed through a study by the Hoover commission on government organization.

Back in those days before the New Deal-Fair Deal got into high gear, equally good statistics were compiled for half as much money by half as many workers, and when industry wanted data the Government didn't collect it went out and got it itself, and did a pretty good job.

Like everything else in Government, there are so many agencies anxious to do so many things that there is tremendous duplication in its statistical work. In itself this wouldn't be so bad except for the fact that every time another agency wants figures it means trouble and expense for the business men who are being figured.

The Hoover commission conceded that the collection and dissemination of information concerning the structure and processes of national life are among the basic functions of government. But it suggested that this could best be done by a single agency serving the other agencies and the public with regularly gathered statistics, with highly specialized fields of research and analysis assigned to a small number of agencies. Only the regulatory agencies would be left to gather statistics necessary for their administrative activities.

Under this set-up, the Bureau of Mines still would be responsible for research and analysis in the general field of mineral economics but would no longer have to defend its statistics against figures developed in other agencies with a view to supporting their own theories and programs.

## Slow Motion

CONGRESS has now been in session 2 months and what it has accomplished could be related in detail in this paragraph.

So far as oil is concerned, the only measures of interest to the industry passed so far are extension of Public Law 395, providing for voluntary allocation agreements, and continuance of the Export Control Act.

Congressional leaders are planning on a July 31 adjournment of the session. That gives them 5 months to dispose of the many highly controversial measures in President Truman's "Fair Deal." Indications are that substantial segments of his program will be gently elbowed aside until next year.

As it stands now, the Republicans in Congress are disorganized and, in the House at least, demoralized; the rank and file of the Democrats are far from united, and the administration's leaders are far from agreement with the President on many issues.

Two of the most powerful members, Representative Doughton of North Carolina and Senator George of Georgia, who head the financial committees, have shown no desire to speed up action on the President's demand for additional taxes, and Doughton has deferred for a month at least any consideration of the administration's legislation for control of industry, materials, prices, and wages. At present, the ways and means committee is studying the President's new social security legislation, and the indications are he will get only part of the reforms he asked for.

Still to come are a dozen appropriation bills on which House hearings have not yet been completed and all of the social reform measures listed by the President—socialized medicine, aids to education, and civil rights among them. In the Senate, a filibuster against the end of filibustering can break out at any time and tie that body up in knots.

The upshot of all this will be that the oil industry will escape the almost continuous going-over it experienced last year, which won't make company executives feel slighted.

## Synthetic Shortage

CONSTRUCTION of plants for commercial production of synthetic fuels may be the only activity undertaken by the Government if and when Congress passes the administration bill providing for government construction of facilities to produce commodities in short supply.

Administration fervor for the construction of steel plants reportedly has cooled off considerably, although President Truman continues to insist that the Government must be prepared to step in if the industry fails to meet consumer demand, and officials admit that, at the moment, the only field in which government action might be justified is that of synthetic fuels.

Even though there is no shortage of natural petroleum, it is explained, the construction of synthetic-fuel plants might be undertaken on the ground, provided for in the legislation, that a shortage "threatens to affect adversely the domestic economy (including the maintenance of maximum production and employment), free competitive enterprise and particularly small business, the general welfare, the national security, or the carrying out of the foreign policy of the United States." National security alone might provide an acceptable basis for government construction of synthetic fuel plants.

Congressional leaders, however, have not displayed undue enthusiasm



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over the idea of putting the Government into industrial production, and it is expected that the President's ideas will get a thorough examination before they are written into law with the result that any authority granted will be so hedged about with restrictions as to put it on the plane of emergency action.

These leaders are putting little credence in the naive suggestion in some quarters that the legislation will prove as good an antidote for deflation as a panacea for inflation, since the President's 5-year plan could be used as a shot in the arm for lagging industry.

### *Tidelands Deadlock*

OBSERVERS in Washington expect President Truman to send a special message on tidelands oil to the Capitol in the near future in an effort to spur Congress to action on the legislation for federal administration drafted by Atty. Gen. Tom C. Clark, Defense Secretary James V. Forrestal, and Interior Secretary J. A. Krug.

Reportedly, the President's advisers have informed him that the legislation will have to be blasted out because both proponents and opponents of federal ownership of the tidelands figure they are strong enough to stop the other side but fear they are not strong enough to defeat it, with the result that neither group wants to make the first move.

On the whole, it looks as though neither bill had much chance to get through this session because of the pressure of other measures on the President's "must" program. This situation is not acceptable to the supporters of legislation returning title to the tidelands to the states, because time is on their side and if they can hold up action until the heat of the mandate which the President has "accepted" cools off they will be in much better position.

The situation is irritating, however, to Clark, whose whole effort to seize the lands by court action may be nullified; to Forrestal, who would like to get title to as much oil as possible against the needs of the next war; and to Krug, who told the National Petroleum Council not long ago it was butting its head against a stone wall and should quit and try to make a deal.

### *Military Salesmanship*

THE National Security Resources Board, smarting under the uncomplimentary publicity given former chairman Arthur M. Hill's ideas that it should be a peacetime industry-control agency—which it still may be if President Truman's antiinflation program goes through—appears to be out to sell itself to American business as the maker of plans which the planners hope never will be necessary.

Board officials are traveling to all parts of the country to tell industrial organizations that all the planning is directed at industrial mobilization in the event of war, emphasizing that "mobilization is not planning" but also emphasizing that a requisite to mobilization is a strong industry to be mobilized.

Recent addresses by NSRB spokesmen disclose that the administration's various industrial programs are being supported as contributing to the national security. Thus in a talk before an industrial preparedness meeting in Boston, Edward V. Hickey, director of production, declared "our concern with plans to see that the nation's manufacturing facilities are geared at all times for maximum output in case of need naturally includes close attention to the raw materials that such production would require. . . . That means conservation in its broadest and most constructive sense." And 3 days later, at Bakersfield, Calif., Col. G. H. Vogel, director of the petroleum division, told the San Joaquin Oil Producers Association that a six-point program to guide mobilization planning activities affecting petroleum called for the encouragement of the economic development and utilization of new sources of supplemental liquid fuels, including synthetics.

To the average observer, those statements would look like support for the administration's proposals to lock up tidelands oil in the ground and go ahead full speed with the Krug-Forrestal ideas for a synthetic-fuel industry.

## Lloyds Asked to Insure Offshore Drilling Work

HOUSTON.—Lloyds of London is being approached this week by two Houstonians on the question of insuring offshore drilling operations in the Gulf of Mexico.

There are no standard rates as yet for these sometimes hazardous operations and some American insurance companies have been unwilling to insure them to date. The two envoys to England are J. E. Pike, marine manager for Langham, Langston & Burnett, Houston insurance firm, and Dr. Irving P. Krick, meteorologist. They hope to convince the London insurance firm that offshore operations are a good risk.

Pike and Krick flew to England and plan to spend a week to 10 days on their mission. They took along with them maps, charts, printed material, and moving pictures on Gulf marine operations. The London representative of Langham, Langston & Burnett is assisting them in their job.

Burnett is much interested in the subject of insuring offshore drilling and states that his company is and will continue to insure such operations. He says, "the insurance rates for these operations are high at present, but through research we have found that offshore drilling risks are insurable."

Three factors will be instrumental in providing lower insurance rates, according to Burnett. They are detailed data on storms that have struck in offshore drilling areas, long-range weather forecasting, and the height of the drilling platform above water.

Dr. Krick maintains his home office in Pasadena, Calif., with a branch in Houston. He is the head of several meteorogical firms and is also president of the American Institute of Aerological Research. During the war he worked for the armed services on weather problems. In addition, he has served in a consulting capacity for several major oil companies with drilling operations in the Gulf.

## Texas Senate Committee Approves Unitization Bill

AUSTIN.—Despite strongly worded opposition, the oil and gas committee of Texas Senate has approved the Moffett unitization bill by a vote of 9 to 6.

Sen. George Moffett's unitization bill is one of two introduced thus far in the legislature to permit voluntary cooperative development of oil and gas fields. Moffett calls for specific exemptions from the provisions of antitrust laws in contrast with a bill introduced by Sen. Wardlow Lane which does not contain this feature. The North Texas Oil and Gas Association is the announced sponsor of the Moffett bill.

The Texas Independent Producers and Royalty Owners Association has made strong public objections to it, and carried its fight this week to the Senate oil and gas committee. Guy Warren, president of TIPRO and vice president of Renwar Oil Corp., Corpus Christi, told the committee, "I believe this is a forced unitization bill."

Warren was given strong support by Elmer Patman, Houston attorney representing Superior Oil Co. of California. He told the Senate group that the proposed bill would "make royalty owners out of us, and you will turn the oil business of Texas over to six or seven companies."

Moffett announced during the hearing that H. P. Nichols, executive vice president of the East Texas Oil Association, has declared himself for the bill. Nichols opposed a similar bill in the last session of the Texas legislature.

In other action, the Texas Senate sent to subcommittee a bill proposed by Sen. Wardlow Lane to set up a standard measurement for natural gas. Opposition is being expressed to this bill by natural-gas companies and some oil companies.

# Freedom begins at home

IN America we take Freedom for granted. It is hard for us to understand why anybody would willingly give up his freedom, to live under a rule that dictates every move of his life.

Yet we must face the sobering fact that right here at home there are plenty of people who are working to curtail, and eventually to abolish personal freedom, and substitute rigid central controls over our activities. Too often these misguided groups and individuals work harder at their self-appointed tasks than do we who think we prefer freedom.

We as business men, above all others, perhaps, have a responsibility in this matter which we can ignore only at the peril of our own survival.

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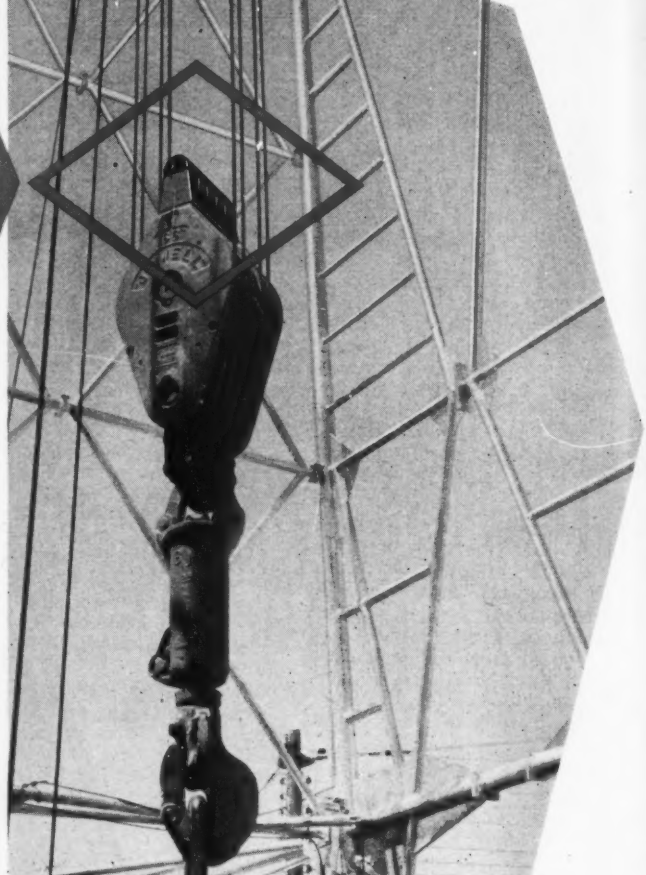
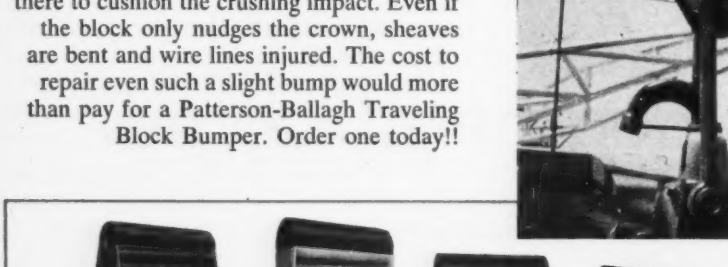
# Rigged for Safety



Before the rotary hose was even connected to the swivel, this crown block was rigged for safety. This operator bought a Patterson-Ballagh Block Bumper for his new equipment before the well was spudded in. He knew that an accidental block crash into the crown could cost him the well and ruin costly equipment, not to mention possible injury to the crew.

If you've ever seen the wreckage after the traveling block has smashed against the crown, it is obvious that much of it could have been prevented if shock-absorbing Patterson-Ballagh Rubber had been there to cushion the crushing impact. Even if the block only nudges the crown, sheaves are bent and wire lines injured. The cost to repair even such a slight bump would more than pay for a Patterson-Ballagh Traveling Block Bumper. Order one today!!

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# Davis Replies to Group's Queries On Basing Point Pricing System

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Davis referred to the cases in answering 54 questions propounded in writing by the trade policies subcommittee of the Senate interstate commerce committee, which is considering legislation designed to draw a line between legal and illegal pricing systems.

The conduit case directly involves questions of basing-point pricing but the Standard Oil case is concerned with price discriminations in violation of the Patman-Robinson Act which the company contends were necessary to enable it to meet competition.

In answering the subcommittee's questions, Davis stuck close to his previous position that basing-point pricing cases brought by the commission have been based only on conspiracy and FTC has never taken the view that the adoption of such a pricing system by an individual seller is illegal.

"There is nothing inherently or necessarily unlawful about delivered prices, zone prices, or freight absorption," Davis said. "However," he added, "there may be discriminations in any prices, and if these discriminations have monopolistic effects or result in injury to competition within the meaning of the Clayton Act, they are unlawful."

**Denies Requirements Made**

Also, he said, "we have not, in our experience, known of a practice engaged in by a group of sellers which produced the effects of a conspiracy or monopoly and yet did not involve a conspiracy or monopoly."

Davis denied that the Pittsburgh-Plus case required f.o.b. mill selling, and expressed the view that when the sellers' market in steel comes to an end "it will be surprising if the parties affected by that order do not abandon rigid f.o.b. mill pricing methods."

Davis apparently summed up the commission's position in responding to a question whether it regards knowing parallel conduct, having the effect of conspiracy—but not resulting from conspiracy—as being illegal under the Trade Commission Act.

"The commission," he said, "regards as an unfair method of competition conduct where each of a group of sellers follows a particular practice with knowledge that the others are following the same practice, each with knowledge of the effects of the common use by the group of the practice, and in fact the practice as thus used results in restraint or suppression of competition. Whether one chooses to call this a conspiracy or not, the fact is that it contains all the elements of conspiracy under long-established and well-recognized interpretation of law."

More directly in line with the proceeding against Standard Oil, Davis made the following response to a question whether, in his opinion, the Clayton Act limits a seller's right to meet competition to doing so in individual cases, to meet individual competitive situations, and where doing so does not injure competition:

"Price differences which appear merely through a seller's action in meeting competition in good faith are not likely to injure competition. In the absence of such injury, nothing in the Clayton Act prevents a seller from meeting competition as widely and as often as he chooses. In the rare case in which such injury appears in spite of the fact that the seller was merely meeting the equally low price of a competitor in good faith, the scope and frequency of the seller's price reductions do not affect the legality or illegality of the discrimination. Such scope and frequency may be relevant to a case, however, as evidence bearing upon the question whether or not discriminations are properly attributable to meeting competition in good faith."

Davis reiterated his opposition to any legislation dealing with the basing-point issue, declaring none was necessary and any would serve only to weaken enforcement of the Clayton Act, but said he would try to draft a measure which would accomplish the purpose without impairing the effectiveness of the antitrust laws.

# Jester Asks for Emergency Funds, Laws to Aid Fight for Tidelands

HOUSTON.—Gov. Beauford H. Jester of Texas has asked for emergency funds and three legislative acts to assist in the state's fight with the federal Government over the "tidelands." In addition, he has solicited the aid of the country's 24 new governors by letter, declaring: "I see the states gradually divesting themselves of their rights and prerogatives and releasing them to the federal Government."

Jester told the new executives that: "If this trend continues, our governors and state legislatures will become mere housekeepers for absentee owners in Washington." A resolution has been passed by the Texas legislature asking all states to petition Washington for a constitutional convention on the tidelands issue. The proposed convention would initiate a constitutional amendment protecting state's rights on the issue.

Jester said that the need for the emergency funds "is immediately urgent because the Attorney General must organize a research staff and prepare his briefs and arguments for the Supreme Court of the United States." The governor also asked for funds for use by the School Land Board in "cooperating with other states in opposing federal control of state submerged lands, advocating continued state ownership, and presenting facts and arguments to the committees of Congress."

Although Jester did not specify how much money was needed, Rep. Leslie King of Vernon filed a bill for introduction in the state's house asking for $200,000. The money would be split between the attorney general's office and the state school land board. In addition to the $100,000, the attorney general would be authorized to use 10 per cent of all collections, other than taxes, made by the department as the result of court judgments from the date of the bill to August 31, 1950.

The three legislative acts asked for by the governor were as follows:

1. Providing for such custody, control, and use of the tidelands beneath navigable waters as is not provided by existing laws, with the state attorney general authorized to bring suits for recovery of title to such lands.

2. Providing for conservation and protection of fish, shrimp, oysters, and other edible marine life in tidal waters, licensing of commercial fishermen and fishing boats, and authorizing rules and regulations of the Game, Fish and Oyster Commission to accomplish these objectives.

3. Allowing the issuance of permits for geological, geophysical, and other exploration work on submerged lands of the state.

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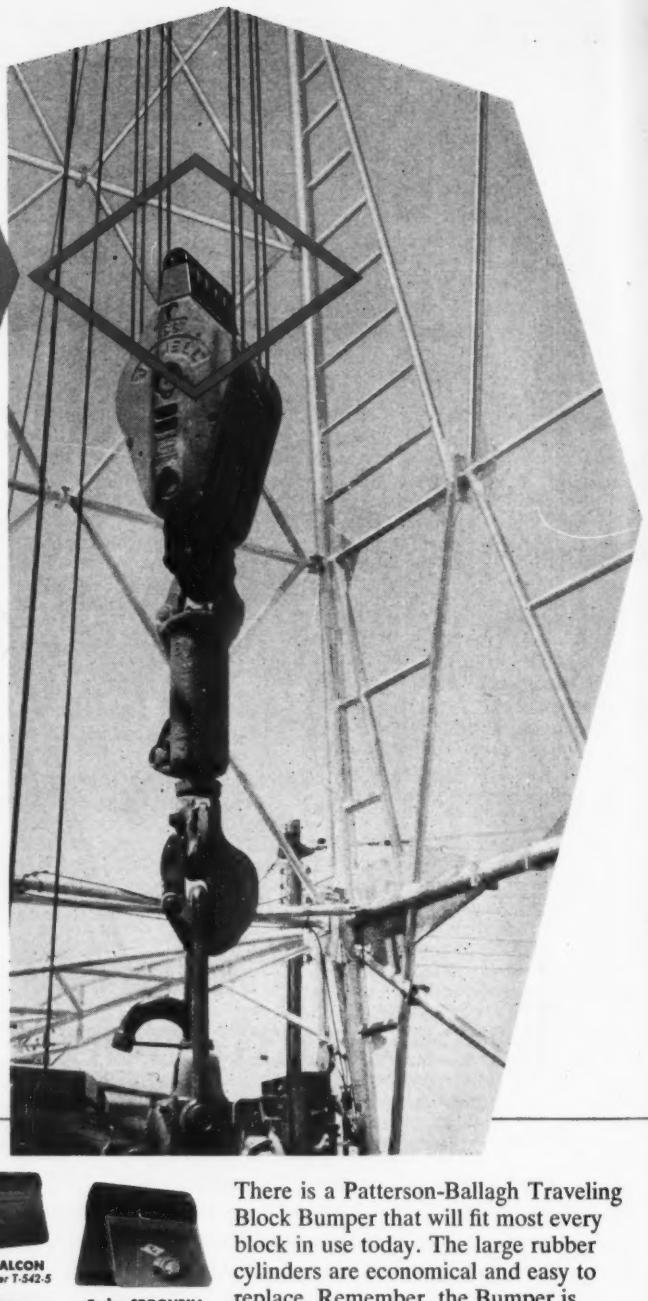

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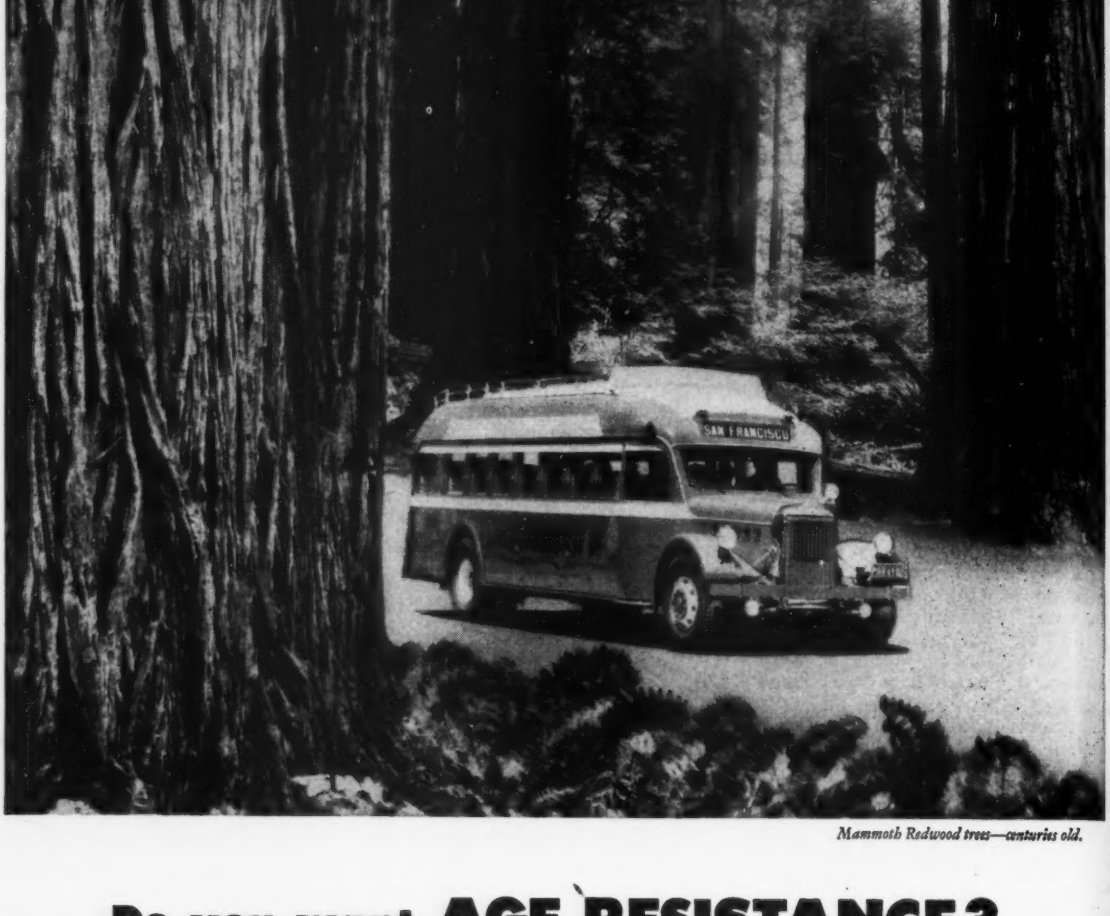


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# Domestic Oil Supply to ERP to Be Investigated by Congress

WASHINGTON.—The first oil investigation of the Eighty-first Congress was launched last week when Chairman Sol Bloom of the House foreign affairs committee announced his plans to inquire into the supply situation as involved in the European Recovery Program.

Bloom's action was based on testimony by L. Dan Jones, attorney for the Independent Petroleum Association of America, complaining that the domestic industry was not getting a fair share of the Marshall plan oil business financed by the Economic Cooperation Administration, that the plan was furthering monopoly on the part of seven companies, five of them American, engaged in foreign production, and that a provision of the Federal Aid Appropriations Act prohibiting ECA from financing bulk commodity purchases at prices higher than the domestic market price is, in effect, a subsidy to the Middle East operators.

The companies operating abroad, Jones said, have been importing oil into the United States at less than the market price, with the result that domestic production in Texas, Oklahoma, and Kansas has been cut back by 500,000 bbl. daily. There is no longer a shortage of oil, he testified, but, instead, a surplus.

### Gasoline Price Questioned

A statement by Jones that the surplus has been reflected in price reductions in heating and residual oils brought questions from committee members as to why there had been no reduction in gasoline prices, and there were indications that when the investigation gets under way there will be as much interest displayed in the price situation as in the supply situation.

Following the hearing, Bloom sent transcripts of Jones' testimony to the ECA, State and Interior departments, and other agencies having an interest in the matter, asking for comment on the various issues and particularly with respect to the domestic supply situation. Bloom said both representatives of the industry and a number of government officials would be called to testify.

At the ECA, Walter J. Levy, chief of the petroleum branch, pointed out that the Foreign Aid Appropriations Act required ECA to see that as much oil as possible was procured by the Marshall plan nations outside the United States.

Levy said that with the recent raising of export quotas by the Office of International Trade the domestic industry would be able to send more abroad and expressed the view that it would be able to compete in world markets.

So far as price is concerned, Levy said, the law is explicit that the market price in this country shall be the ceiling but did not empower the ECA to insist that sellers cut their prices for any reasons other than competition.

## More Than 500 Expected To Attend A.P.I. Meeting

HOUSTON.—Atomic energy, oil and gas conservation, and a new drilling method will be among the varied topics covered by the March 9-11 meeting in Galveston of the Southwestern district of the American Petroleum Institute's division of production.

Over 500 operating personnel from Texas, Louisiana, New Mexico, Arkansas, and Mississippi are expected to converge on the island city for the meeting. E. B. Miller, Jr., of Tide Water Associated Oil Co. is chairman of the program committee and R. E. Bridges, Humble Oil & Refining Co., is district chairman.

Opening day activities will consist of registration and committee meetings. On Thursday, speakers and their topics will be: "Achievements and Unsolved Problems in Oil and Gas Conservation," Hines H. Baker, president, Humble Oil & Refining Co.; "The Public's Stake in the Oil Industry," R. L. Wheelock, Wheelock & Collins, Corsicana, Tex.; "Nuclear Fission as a Source of Competitive Enery," Dr. T. R. Hogness, director, Institute of Radiobiology and Biophysics, University of Chicago; "The Coast Guard Looks at Offshore Petroleum Developments," J. A. Kerrins, U. S. Coast Guard, New Orleans; "Experiments in Rotary Percussion Drilling," W. E. Harpst and E. E. Davis, Shell Oil Co., Inc.; and "The Analysis of Stresses in Drill Pipe," Murray F. Hawkins, Louisiana State University, and Norman Lamont, Shell Oil Co., Inc., Tulsa.

Friday topics are: "Abnormal Pressure and Lost Circulation," P. E. Chaney, Sun Oil Co., Beaumont; "A Mathematical Analysis of Hydraulic Factors Affecting the Rate of Penetration of Drag-Type Rotary Bits," John R. Eckel and J. P. Nolly, Humble Oil & Refining Co., Houston; "Selection and Maintenance of Lease Production Tanks in Sulfide Areas," H. D. Murray, The Texas Co., Midland, Tex.; and "A New Look at Vocational Training," John A. Ritter, Sun Oil Co., Dallas, and John Woodruff, The University of Texas, Austin.

## Parks Heads Offshore Group

HOUSTON.—Mercer Parks of Humble Oil & Refining Co. has been elected chairman of a group of oil operators engaged in offshore drilling in the Gulf of Mexico. He succeeds Frank A. Lindeman of the Stanolind Oil & Gas Co., who was recently transferred to Tulsa. The group meets informally to discuss common problems in marine drilling.

## *Next Week*

**From California (on natural-gasoline plants).**—General Petroleum Corp.'s Burrel plant in the Fresno area, which achieves 80 per cent propane and 90 per cent isobutane extraction, is described by M. E. Garrison of G.P.'s engineering department.

**From California (new reservoir-engineering method).**—Carlton Beal, well-known Los Angeles petroleum consultant, discusses the use of a new "Y" factor, which is a pool-performance index in terms of barrels of oil recovery per 1,000 psi. decline in reservoir pressure per acre-foot of reservoir volume.

**Byproduct power via topping turbines.**—J. B. Glasby, with Atlantic Refining Co., details design and equipment for additional steam and electrical power facilities at his company's Philadelphia refinery.

**New surveying instrument.**—The Journal's Gulf Coast editor presents engineering article on new automobile-mounted surveying instrument built by Sun Research & Development and Sperry-Sun Well Surveying Co. which speeds geological work. Results in Texas Gulf Coast area have been very successful.

**The first dually pressure-maintained, completely unitized oil field.**—W. L. Horner and C. W. Ziemer of Barnsdall Oil Co. give engineering report on this operation, West Tepetate, La.

**"Reservoir Engineering," by Dr. Morris Muskat.**—No. 4 Summarization Statement on "Injection Well Histories in Water Flooding."

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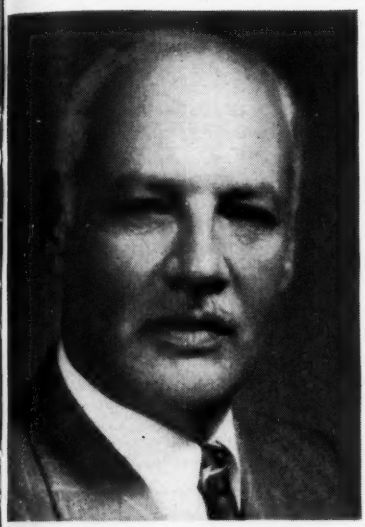
# PERSONALS



## Exploration Department Is Headed by Barnwell

A 49-YEAR-OLD geologist, who has been actively connected with the exploration and development of oil in the Southwest Pacific area for nearly a quarter of a century, has been made manager of the exploration department of Standard-Vacuum Oil Co.

He is George F. Barnwell who arrived in New York recently from Palembang, Sumatra, where for the last 3 years he has been exploration manager for the producing affiliate, Standard-Vacuum Petroleum Mij. In his new position in New York, he succeeds Raymond Leibensperger, who retired January 1.

Barnwell, a native of Vancouver, B. C., entered the University of British Columbia in 1916 and was graduated in 1921 after a period between 1917 and 1919 as a corporal in the Canadian field artillery in France. He took an M.S. in geology from Wisconsin University in 1922 and spent 3 years as an instructor in geology at the Missouri School of Mines.

He joined Nederlandsche Koloniale Petroleum Mij., former name of Standard-Vacuum's operating affiliate in 1925 and worked as a geologist in Java and Sumatra until March 1934. At that time, he went to The Hague as assistant to the chief geologist of N.K.P.M. and a member of the advisory technical committee to Nederlandsche Nieuw Guinee Petroleum Mij. In April 1940, he was shifted to Gisborne, New Zealand, as chief geologist and manager of the New Zealand Petroleum Co., remaining there until January 1946 when he became exploration manager at Palembang.

**Sidney A. Swensrud,** president, Gulf Oil Corp., has been named a director of the Pittsburgh, Pa., branch of Federal Reserve of Cleveland.

**Victor VerMilyea,** administrative assistant, purchasing department, Ashland Oil & Refining Co., Ashland, Ky., has joined the staff of La Gloria Corp., Corpus Christi, Tex., as head of the company's purchasing and traffic departments. A graduate of Virginia Military Institute, VerMilyea was employed for 6 years by United Refining Co., Warren, Pa., working in laboratories and stills of the company.

**R. E. Bridges,** Humble Oil & Refining Co., Houston, chairman of the southwestern district, division of production, American Petroleum Institute, has announced committee chairmen for the spring meeting, to be held in Galveston, Tex., March 9-11. They include: **E. P. Hubbard, E. B. Miller, Jr., Orien W. Van Dyke, W. H. Miner, C. F. (Chet) Whaley,** and **Warren L. Baker,** all of Houston.

*T. E. SUNDERLAND*

**Thomas E. Sunderland,** Chicago, chief counsel for Standard Oil Co. (Ind.), has been elected a director of the company, and will fill the position on the board vacant since the death of Buell F. Jones, vice president and general counsel, in November 1947. Sunderland was appointed general counsel of the company in June 1948. He joined Indiana Standard from the position of general counsel of its subsidiary, Pan American Petroleum & Transport Co., New York City. Sunderland succeeded Jones as a director of Pan American in January 1948 and is continuing in that capacity in addition to serving as general counsel and director of Indiana Standard.

**James W. Terry,** Nashville, Tenn., has joined the staff of Magnolia Petroleum Co., at Oklahoma City, as a civil engineer.

**Robert A. Mason,** petroleum engineer, Stanolind Oil & Gas Co., Shreveport, La., has been transferred to the company's central division office at Oklahoma City.

**R. A. Andresen,** engineer for California Texas Oil Co., has been appointed assistant chief engineer of the company's manufacturing department, with headquarters in New York City. His new duties will be the handling of all refinery engineering and construction projects east of Suez, and in the eastern Mediterranean.

*DR. T. W. EVANS*

**Dr. Theodore W. Evans,** manager of the Emeryville, Calif., research laboratories, Shell Development Co., has been appointed director of research for the company, and assigned in charge of the operation and research program now being carried on at Emeryville, where, with more than 1,000 employes, facilities comprise the largest commercial unit in the West.

Joining the Emeryville staff in 1930 as a research chemist, Dr. Evans was active in early development of alcohols, ethers, and esters from refinery-cracked gases, and in development of the solvent extraction theory. During the critical rubber shortage in World War II, Dr. Evans' studies led to early supplies of vital synthetic rubber by an exclusive company process.

Appointed an associate director of research at the laboratories in 1942 succeeding the late Walter J. Hund, Dr. Evans attended the College of Puget Sound, Tacoma, Wash., and in 1930 he completed graduate work in chemistry at the University of Washington, receiving his Ph.D. degree.

**F. B. (Dick) Haverfield,** Continental Oil Co., Ponca City, Okla., has been named program chairman for the 1949 annual meeting of Natural Gasoline Association of America, which will convene at Fort Worth, Tex., April 20-22. Assistant chairmen are: **James Doughty,** vice president, Southern Minerals Corp., Corpus Christi; **R. W. Heath,** Signal Oil & Gas Co., Los Angeles; **Fred Townsend,** Lone Star Gas Co., Dallas; **Albert H. Weil,** United Gas Pipe Line Co., Shreveport, La.; and **Harry Wheeldan,** Shamrock Oil & Gas Co., Amarillo, Tex.

**Neil S. Whitmore,** Stanolind Oil & Gas Co., has been named assistant plant superintendent at the company's Slaughter gasoline plant near Levelland, Tex. He has been at the site during construction as a field-project engineer. Other appointments announced by the company include: **Glenn A. Ayling,** named plant fore-



XUM

# PERSONALS

man at the Slaughter plant; **Jack E. Fulgham,** named plant engineer; **Robert T. Packard,** named assistant district clerk, East Texas district, with offices at Longview, Tex.; and **Joseph W. Tribble,** made farm boss in the Slaughter area, being elevated from head roustabout in the East Texas area, at Greggton.

*DR. E. N. KEMLER*

**Dr. Emory N. Kemler,** New York City, research and production engineer, has been appointed associate director of Southwest Research Institute, Houston, succeeding **Dr. John V. Pennington,** who is on leave of absence. Kemler resigned the post of acting director of research for New York University to administer the institute program in Houston. He formerly was in charge of production engineering for Gulf Oil Corp., Tulsa, and has had wide experience in petroleum engineering, analysis of oil problems, investigation of pumping problems, and bottom-hole pressure pumping.

**Warren Spaulding,** Gulf Oil Corp., geologist, has joined the geological department of Petroleum, Inc., Wichita, Kans. He is a graduate of Iowa State College.

**Kenneth A. Covell,** chief production engineer, Pure Oil Co., has been named assistant vice president for transportation and supply. He will be succeeded as chief production engineer by **Harry L. Moir.** In making the announcement of Covell's advancement, the company also disclosed that **Lisle W. Sweet,** veteran head of the company's service department, marketing division, has been named assistant vice president for northern marketing, succeeding **Charles W. Snider,** who is now executive vice president of Hickok Oil Corp., Toledo, Ohio.

**Clifford B. Marshall,** formerly general manager of the India division of Standard-Vacuum Oil Co., has been elected a member of the company board of directors. Marshall joined the company in 1920 and has been general manager of the India division, which also includes Pakiston, Burma, and Ceylon, since 1944. His new duties are at Standard-Vacuum's New York office. **Rufus T. Burton,** a member of the company's India marketing staff since 1930, has been appointed area manager for the India marketing division.

**William R. Lattimore,** chief engineer for the Afton, Okla., station, Ajax Pipe Line Corp., Tulsa, was honored at a special banquet recently for completing 30 years of service with the firm. Lattimore is the fourth company employe to receive a 30-year gold-pin award.

**R. B. Bundle,** the Happy Co., has been named chairman of Seminole, Okla., chapter, American Petroleum Institute. **Paul D. Godfrey,** Atlantic Refining Co.; **K. L. Brown,** Magnolia Petroleum Co.; and **C. E. Lance,** Oil Well Supply Co., were named vice chairmen.

A number of men engaged in the oil industry have been elected to the board of directors, Stanford Research Institute, Stanford, Calif. They include: **W. W. Valentine,** president, Fullerton Oil Co., Los Angeles; **R. G. Follis,** vice chairman of the board of directors, Standard Oil Co. of California, San Francisco; **William L. Stewart, Jr.,** executive vice president, Union Oil Co., San Francisco; and **Tom Slick,** independent operator, San Antonio, Tex.

**C. F. Beatty** director of Socony-Vacuum Oil Co., Inc., and former president of Socony Paint Products Co., has been reelected for a 1-year term as board member of the National Industrial Conference Board. Beatty has been with Standard Oil Co. of New York since 1912.

**C. W. Edwards,** Houston, and **William Helis, Jr.,** New Orleans, independent oil operators, are planning a $600,000 fish cannery in Houston, to can tuna caught in the Pacific. The company has spent a reported $1,000,000 in Houston shipyards to outfit four fishing vessels.

**K. A. Robertson,** area supervisor, Canadian and Rocky Mountain division, United Geophysical Co., Tulsa, has been appointed vice president of United Geophysical Co., of Canada, and will make his headquarters in Calgary, Alta. United Geophysical also announced the following appointments: **Norman J. Christie,** appointed area supervisor for Mid-Continent and Gulf Coast division with headquarters in Tulsa; **Wayne A. Phares,** appointed area supervisor for gravity operations, United Geophysical Co. of Canada, with headquarters in Calgary; **Wayne H. Denning,** appointed area supervisor for the company's California and West Coast division, with headquarters in Pasadena, Calif.; and **R. A. Pohly,** named gravity supervisor for Mid-Continent division, with headquarters in Terre Haute, Ind.

**Charles A. Johnson,** Socal Oil & Refining Co., has been elected president of the Independent Refiners Association of California. **D. B. O'Neill** has been elected vice president and general manager; **William F. Barshfield** of Harbor Refining Co., vice president; and **N. D. Taylor,** Hancock Oil Co., secretary-treasurer.

**George F. Getty** has discontinued his activities as an independent oil operator in California and has taken a position with Pacific Western Oil Corp.

**W. Roy Davis** has been appointed manager of the planning and operations division, manufacturing department, Richfield Oil Corp., succeeding the late Milford E. Tracy.

*W. LEO AUSTIN*

**W. Leo Austin,** head of Mid-Continent Petroleum Corp.'s tax department, has joined Kerr-McGee Oil Industries, Inc., as head of the accounting and tax departments in the company's Oklahoma City headquarters. He succeeds **Charles R. Bell,** who resigned to accept a position in Continental Oil Co.'s tax department. Austin was tax counsel and accountant in Tulsa from 1929 to 1935, when he became tax counsel for Mid-Continent. In 1942 he organized the company's income and excise-tax department. He is a member and former chairman of the Mid-Continent Oil and Gas Association's standing committee on federal and excise taxation, and is also a member of the association's special depletion committee on which he has served since its inception. He is a graduate of George Washington University school of law, and received his B.C.S. degree from Southeastern University, Washington, D. C.

**Grady E. Johnson** has joined the staff of Subsurface Engineering Co., Oklahoma City, as a petroleum engineer. He formerly lived in Beaumont, Tex.

**G. W. (Woody) Speer,** formerly with Bay Petroleum Corp., as a geologist, and **W. O. Allen, Jr.,** head of the geological staff, National Cooperative Refinery Association, have joined the organization of **M. B. Armer,** Wichita, Kans. Speer will be headquartered in Wichita and Allen will be at Oklahoma City. **Charles Brown** will replace Allen as head of the refinery association's geological department.

**E. E. Pyles,** Jergins Oil Co., Long Beach, Calif., has been elected president of the San Joaquin Valley Oil Producers Association. Other officers named: **H. F. Owen,** vice president; **Lowell W. Saunders,** vice president; **C. O. Premo,** secretary. Directors: **W. C. Whaley, W. M. Keck, Jr., Harold R. Pauley, Richard Fenton, R. E. McCarthy, R. E. Gignoux, E. C. Reid, J. B. Spellacy, L. L. Aubert, Ross McCollum, L. A. Cranson,** and **J. M. Feldman.**

**M. R. Stipp,** Standard Oil Co. of Texas, is in charge of the company's newly opened production office at Snyder, Tex.

**James H. Curtis,** manager of General Petroleum Corp.'s Torrance, Calif., refinery, has been appointed manager of refineries. Succeeding Curtis as manager of the Torrance plant is **A. E. Thompson,** who has been assistant manager. **Randal Maass,** formerly refinery engineer at Torrance, has been made assistant manager.

## SHIFTS—

**George L. Paulus,** foreman, Union Oil Co., Santa Maria to Van Nuys, Calif.; **R. M. Albers,** engineer, Shell Oil Co., Inc., Abernathy to Denver City, Tex.; **Tom Slack,** engineer, Gulf Oil Corp., Kilgore to Longview, Tex.; **John E. Futral,** engineer, The Texas Co., Ozona, Tex., to Port Barry, La.; **C. H. Kallenberger,** engineer, The Texas Co., Salem to Farina, Ill.; **L. W. Goodrich,** engineer, The Texas Co., Sequin to West Columbia, Tex.; **Edmond Key, III,** engineer, Stanolind Oil & Gas Co., Marshall, Tex., to Shreveport, La.

**J. C. Brown,** superintendent, Sun Oil Co., Hebronville to Sullivan City, Tex.; **V. E. Lehmberg,** engineer, Shell Oil Co., Inc., Pasadena, Tex., to Houston; **F. L. Lee,** engineer, Shell Oil Co., Inc., Wichita Falls, Tex., to Long Beach, Calif.; **R. W. Roring,** engineer, Stanolind Oil & Gas Co., Monroe, La., to Ulysses, Kans.; **John G. Watson,** geologist, Shell Oil Co., Inc., Shreveport to New Orleans, La.; **Fletcher F. Farrar,** engineer, The Texas Co., Sims to Salem, Ill.; **F. W. Briggs,** foreman, Continental Oil Co., Berthoud to Littleton, Colo.; **Jack E. Clark,** superintendent, Noble Drilling Corp., Rangely, Colo., to Pauls Valley, Okla.; **O. S. Gibson,** superintendent, Armer Drilling Co., Great Bend, Kans., to Oklahoma City; **Marlin R. Taylor,** engineer, Gulf Oil Corp., Lyons, Kans., to Hobbs, N. M.; **J. C. Jarrell,** engineer, The Texas Co., Ardmore, Okla., to Wewoka, Okla.; **Edward Strunk,** engineer, Phillips Petroleum Co., Bartlesville, Okla., to Old Ocean, Tex.

**J. K. Welchon,** engineer, Phillips Petroleum Co., Oklahoma City to Beaumont, Tex.; **Charles L. Severy,** geologist, California Co., Laramie, Wyo., to Palo Alto, Calif.; **R. F. Boswell,** engineer, Phillips Petroleum Co., Shidler, Okla., to Odessa, Tex.; **T. L. Scott,** engineer, Phillips Petroleum Co., Shidler, Okla., to Odessa, Tex.; **William T. Ford,** engineer, Carter Oil Co., Tulsa to Seminole, Okla.; **Murry Williford,** foreman, Phillips Petroleum Co., Del Rio to North Uvalde, Tex.; **Lewis M. Thompson,** engineer, Stanolind Oil & Gas Co., Levelland to Lubbock, Tex.; **Bill Wade,** geologist, Continental Oil Co., Midland, Tex., to Nelson, Neb.; **Charles Wirth, III,** engineer, E. I. du Pont de Nemours & Co., Chicago to Tulsa; **Verdi H.** Strawn, foreman, Sinclair Refining Co., Coffeyville, Kans., to Harvey, Ill.

# DEATHS

**John A. Van Wynen,** former vice president of three Standard Oil Co. (N.J.) affiliates, died February 18 at Glen Ridge, N. J. He joined Standard Oil in 1888 as junior clerk, and rose to vice presidency of Standard Oil Co. of Pennsylvania, Stanco, Inc., and Pennsylvania Lubricating Co.

**Haymon Krupp,** 74, El Paso, Tex., pioneer independent operator who helped start development of University of Texas oil lands in West Texas, died February 21 in Rochester, Minn.

**Chester A. (Chess) Baltzell,** 68, independent oil operator, Houston, died February 24 in Houston. He formerly was associated with the late Charles F. Farren, in Tulsa.

**James C. Lough,** 46, assistant foreman of field production at Wewoka, Okla., for Mid-Continent Petroleum Corp., died in Tulsa February 21.

**Jack Stratton,** 53, president of Dixieland Petroleum Corp., New York City, died February 23 in Eastland, Tex.

**H. L. Stuckey, Jr.,** 38, purchasing agent for Gulf Coast division, Union Oil Co. of California, was fatally injured in an automobile accident near Abbeville, La., February 22.

**William E. McCarthy,** oil producer with interests in California and Pennsylvania, died February 24 in Bradford, Pa.

**Stephen L. Pinckney,** 62, independent oil operator, died in Houston February 22.

**Ernest H. Hurtzig,** 68, retired personnel manager, Esso Standard Oil Co., Bayonne, N. J., died February 23 in Bayonne.

**Robert Nock,** 55, secretary, Amerada Petroleum Corp., died February 22 in New York City. He served as assistant secretary for the company 8 years before being promoted to secretary in 1926.

**J. M. Bradshaw,** 54, Dallas, Tex., president of Hercules Oil Co., died February 28 in Tulsa. Bradshaw, who had been connected with the oil industry for more than a quarter century, was widely known as a petroleum marketer and broker.

**Prof. E. C. Baker,** head of the mechanical engineering department, Oklahoma A. & M. College, Stillwater,, died February 22 in Stillwater. He was a past president of Mid-Continent section, American Society of Mechanical Engineers.

**Stanley Elliot (Pappy) Tenan,** 39, sales engineer for Tret-O-Lite Co., Russell, Kans., died February 22 in Russell.

**Jack V. Drumheller,** 56, Calgary, Alta., Canada, one of the founders of D. & G. Oil Co., and Midland Petroleum Co., died February 25 in Calgary.

**C. J. White,** 50, acting division manager, Texas Pipe Line Basin System, Houston, died February 25 at Midland, Tex.

**Alfred Bailey Weiss,** 43, production superintendent for Pure Oil Co. at Midland, Tex., died February 26 in Midland.

**Elmer G. Diefenbach,** 55, who pioneered in the financing and development of some of the country's major natural-gas transmission companies, died February 27 in New York City. He was a director of Panhandle Eastern Pipe Line Co.

**Harry R. Hughes,** Tulsa, veteran cable-tool contractor, died February 22 in St. Louis, Mo.

**John W. Brown,** 52, Tulsa, veteran special agent for Sinclair Prairie Oil Co., died in Tulsa February 28.

# . . . PRESSURE MAINTENANCE *in Arkansas*

**by D. H. Stormont**

## Output from the state's pressure-controlled fields will soon exceed one-half of the total production

ADOPTION of pressure-maintenance projects in Arkansas oil fields has continued until the output of such pressure-controlled fields will soon account for slightly more than one-half of the state's entire daily oil production. Currently, the production from pressure-maintained fields amounts to 45 per cent of Arkansas' oil output. When gas injection is started in McKamie-Patton field a few months from now the halfway mark will be passed.

On the average, these pressure-maintenance programs are expected to double the amount of oil which would be produced under primary methods. Total increase in reserves resulting from these projects is estimated to be in excess of 130,000,000 bbl.[1] Since Arkansas' annual production currently is about 30,000,000 bbl., it may be said that more than 4 years' supply have been added to the state's reserves.

The most outstanding fields from standpoint of new reserves added as a result of adopting pressure maintenance, are Schuler and Midway. Other highly successful operations are under way in Magnolia and Haynesville fields. At Atlanta field a salt-water-disposal project was started late last year, and at Wesson field a unitized project was begun. Unitizing of McKamie-Patton field is in progress and return of gas will be started as soon as a compressor plant is completed, probably in June. Summaries of these projects, all of which are in Lafayette, Columbia, Union, and Ouachita counties of southwestern Arkansas, are given in an accompanying table. Other data relative to these programs will be presented after a discussion of the McKamie-Patton project.

Unitized operation of McKamie-Patton field started last December 1 and studies are now under way to determine the most effective method of conducting a gas-recycling program for producing its oil and gas condensate. Wells necessary to complete the drainage pattern, as well as any additional wells required for gas injection, will then be drilled. The installation of 4,800 hp. of compressor capacity for returning gas to the reservoir is under way and is expected to be completed July 1.

During the hearing held to consider the feasibility of adopting unitized pressure maintenance, it was said that the project is expected to increase the oil and condensate yield from the Smackover lime reservoir from 32,300,000 to 41,700,000 bbl.—a gain of 29 per cent in ultimate recovery. Core-sample studies have indicated that the original reservoir contained about 83,000,000 bbl. of crude oil and condensate. Therefore, estimated ultimate recoveries under pres-

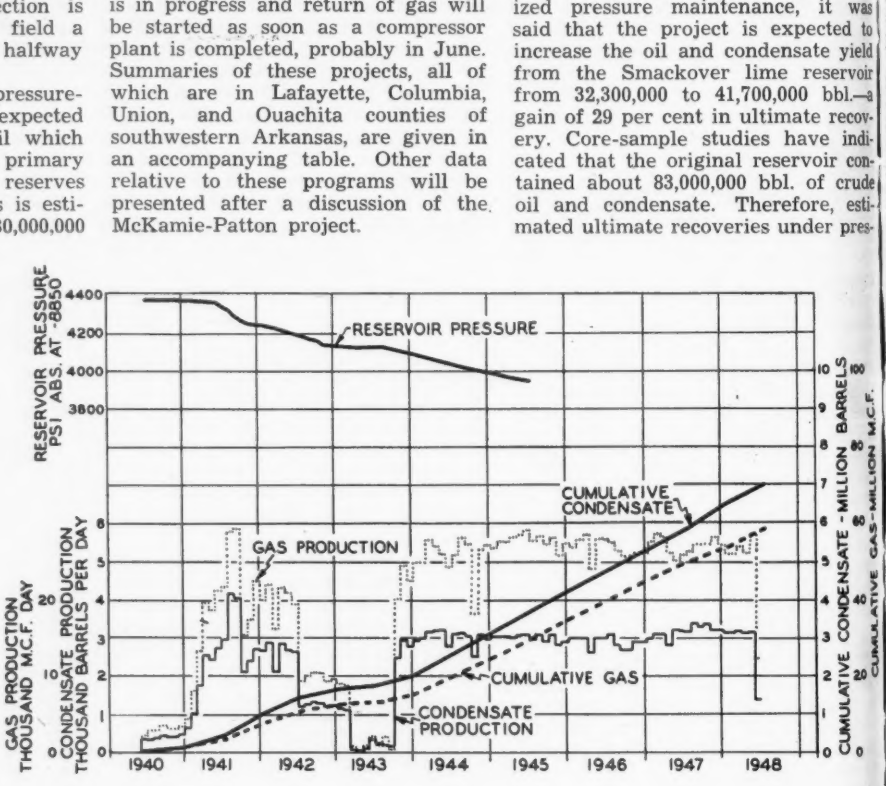



*Fig. 1—(Right) Pressure-production history for McKamie field. Reynolds limestone*

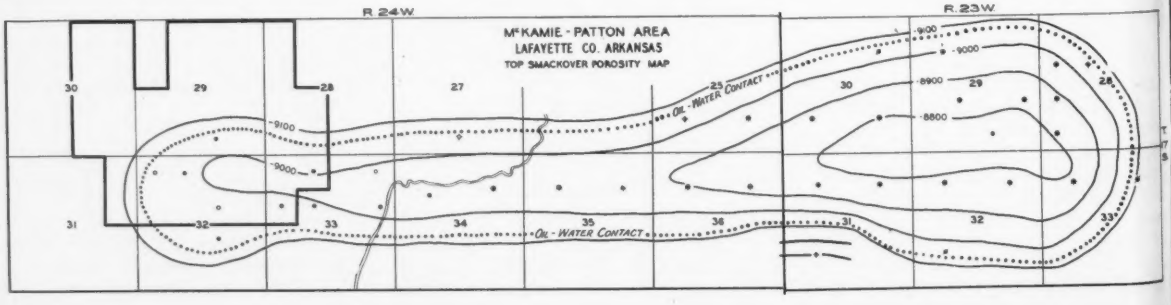



*Fig. 2—(Below) McKamie-Patton. Area outlined in western end of structure is the Patton unit*

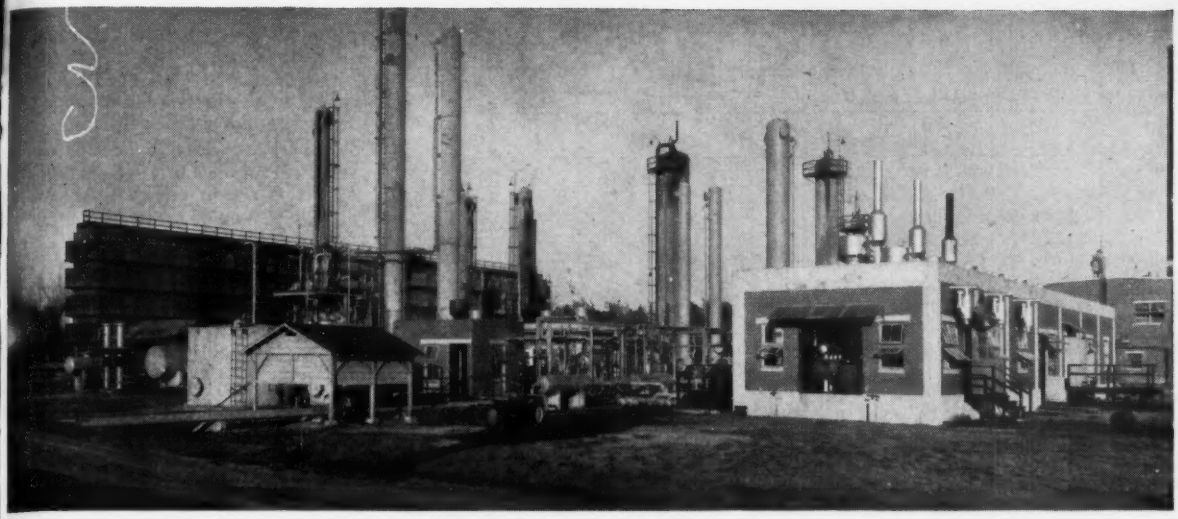


*Fig. 3—View of principal processing units at the McKamie Gas Cleaning Co. plant, McKamie-Patton field, Arkansas*

sure maintenance will approximate 50 per cent of the original oil in place.

Production at McKamie-Patton is from an anticlinal fold in the Smackover limestone at depths ranging from 8,900 to 9,500 ft. Contours drawn on top of the main porosity in this zone show a long asymmetrical fold extending east-west for some 7 miles along the crest with a maximum width of 1¾ miles in the McKamie area. (See Fig. 2.) Flanks of the fold dip steeply, averaging about 600 ft. per mile on the east and north sides. Condensate production is obtained from the upper portions of the structure, and crude oil is found around the flanks of the structure. In the McKamie area the oil rim is quite narrow, but it widens in the Patton (western) portion of the field where the dip is not so great.

### Field Statistics

Gas-condensate production was discovered at McKamie in June 1940, and crude oil was discovered in the Patton area in October 1941. These were first believed to be separate reservoirs but subsequent development (21 condensate and 9 oil wells on 160 and 40-acre spacing, respectively) proved the two areas to be producing from a common reservoir. Average producing section of the gas condensate wells is about 100 ft., while that of the oil producers is around 25 ft. The oil-water contact is located about 9,072 ft. subsea and the average gas-oil contact is estimated to be at about 9,040 ft. subsea. Original reservoir pressures were about 4,409 psi. at 8,980 ft. subsea. When the last survey was taken, in May 1947, average bottom-hole pressure was 3,586 psi. Permeabilities are relatively uniform and high, averaging 460 md. The field's production history is shown in Fig. 1.

Early in the field's life it became apparent that while a water drive existed, the drive was not sufficient to prevent loss of hydrocarbons because of retrograde condensation in the reservoir. Laboratory analyses of the gas-cap fluid at that time indicated these retrograde condensation losses would approximate 14,000,000 bbl., as a maximum, if reservoir pressures were not maintained.

While the need for pressure maintenance or recycling was recognized early in the field's life, several years were required before a unit agreement could be reached which was satisfactory to most of the operators. When permission for the project was granted by the Arkansas Oil and Gas Commission last October, however, operators owning 97 per cent of the operating interest and over 75 per cent of the royalty interests had signed the agreement.

The field was unitized on the basis of the value of recoverable products (crude oil, condensate, natural gas, and "other substances") in place as of July 30, 1947. The unit area was confined to the present producing horizon in the Reynolds member of the Smackover limestone, with the provision that if future drilling extends the field's limits the unit area can be extended. This unit area was divided into 68 tracts, according to lease ownership, and the amount of recoverable products underlying each tract was calculated. "Tract factors" were then established for each tract, on the basis of the ratio of the value of unitized products underlying the tract to the value of all recoverable products for the entire unit area. Individual operators participate in the field's total operating expenses and production in proportion to their ownership of tract factors.

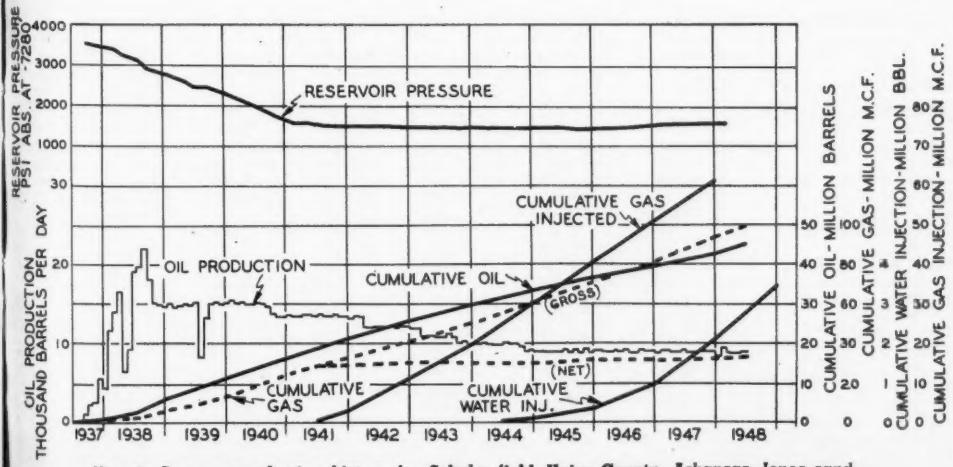

RESERVOIR PRESSURE PSI ABS. AT 7260'
RESERVOIR PRESSURE
OIL PRODUCTION
CUMULATIVE GAS INJECTED
CUMULATIVE OIL
(GROSS)
(NET)
CUMULATIVE GAS
CUMULATIVE WATER INJ.
OIL PRODUCTION THOUSAND BARRELS PER DAY
CUMULATIVE OIL - MILLION BARRELS
CUMULATIVE GAS - MILLION M.C.F.
CUMULATIVE WATER INJECTION - MILLION BBL.
CUMULATIVE GAS INJECTION - MILLION M.C.F.
1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948

*Fig. 4—Pressure-production history for Schuler field, Union County, Arkansas. Jones sand*

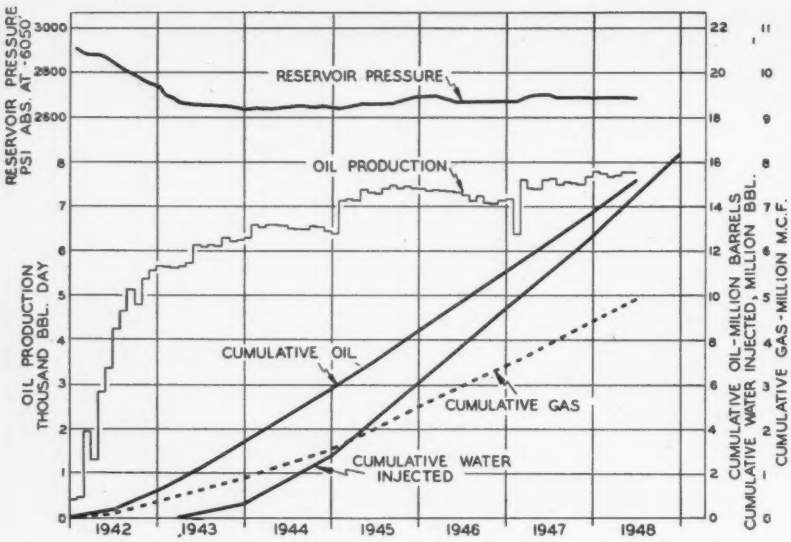



*Fig. 5—Pressure-production history for Midway field, Lafayette County, Arkansas. Smackover limestone*

With only one exception all parties owning appreciable interests in McKamie-Patton have executed the basic unitization agreement. Their leases, representing 97 per cent of the operating interest in the field, are being operated by Carter Oil Co. in accordance with the unitization agreement.

Nearly all gas produced at McKamie-Patton is processed in the 25,000-M.c.f. hydrogen-sulfide-removal and gasoline-absorption plant of McKamie Gas Cleaning Co. (See Fig. 3.) This is necessary because gas produced with the oil and condensate is extremely sour, averaging 4,250 grains of $H_2S$ per 100 cu. ft., corrosive, and unmarketable in its natural state. In the fall of 1943, a raw-sulfur extraction plant was placed in operation by Southern Acid & Sulphur Co. to handle all the acid residue gases from the gasoline plant. The sulfur plant is not affected by the unit agreement.

For providing the high-pressure gas necessary to the pressure maintenance project a new building for housing the compressors will be constructed adjacent to existing McKamie Gas facilities. These units will compress 38,000 M.c.f. daily to 3,300 psi. for return to the reservoir. In addition, some 8,000 to 14,000 M.c.f. of extraneous gas will be purchased and compressed for returning to the Reynolds lime. Contract for this work has been let to Jones & Laughlin Engineering Co., Tulsa.

### Schuler Field

At Schuler field, reservoir pressures in the Jones sand dropped from an original of 3,520 psi. in September 1937 to 1,609 psi. in February 1941. At that time all operators but one entered into an agreement to unitize Jones sand properties and by July were returning gas to the reservoir. Injections of gas into the gas-cap portion of the field slowed down the rate of decline in bottom-hole pressures so that by May 1944 the average had dropped only 50 psi. from 1,502 to 1,452 psi. In June 1944 injection of salt water was commenced and in May 1945 this water drive was supplemented with fresh water injections.[3]

This program completely arrested the decline in bottom-hole pressure. (See Fig. 4.) In fact, the most recent survey (December 1948) showed an average of 1,618 psi., 116 psi. higher than when the gas-injection program was started. During this period of operation the field produced a total of 29,391,000 bbl. of crude to bring the cumulative total to 46,129,000 bbl.

Under primary methods it was estimated that from 33,000,000 to 35,000,000 bbl. would ultimately be recovered from the Jones sand reservoir—11,000,000 to 13,000,000 bbl. less than already has been produced. Upon unitization the ultimate-recovery estimate was raised to about 55,000,000 bbl. Now, with the water and gas drives being much more efficient than expected, most engineers estimate that the field ultimately will produce at least 70,000,000 bbl. This would amount to a 70 per cent recovery of the 100,000,000 bbl. of oil originally in place.

Not only has the project nearly doubled the expected oil recovery from the Jones sand, but it has been beneficial in other ways. Relatively little decline in the rate of production has taken place during the 7½ years of unit operation—the reservoir is now yielding 9,000 bbl. daily as compared with 13,400 bbl. in June 1941. Also, instead of all wells now being on the pump, four gas-lift systems represent the sole investment in artificial-lift equipment.

### Midway Field

At Midway field in Lafayette County, a cooperative salt and fresh-water-injection project has held bottom-hole pressures constant for 6 years. (See Fig. 5.) Reservoir pressures now average about 2,699 psi. as compared with an original of 2,920

*(Continued on page 94)*

**TABLE 1—SUMMARY OF PRODUCTION HISTORY OF ARKANSAS FIELDS UNDER PRESSURE MAINTENANCE**

| Field and formation— | Schuler Jones sand | Midway Smackover lime | Magnolia Smackover lime | Haynesville* Pettit lime | Atlanta Smackover lime | Wesson Hogg sand | McKamie-Patton† Smackover lime |
|---|---|---|---|---|---|---|---|
| Date press. maintenance started | July 1941 | April 1943 | Jan. 1945 | Sept. 1944 | Dec. 1948 | Aug. 1948 | —1948 |
| Proven area, acres | 2,960 | 1,820 | 4,400 | 2,800 | 2,200 | 1,560 | 5,520 |
| Est. original oil in place, bbl. | 100,000,000 | 191,000,000 | 244,000,000 | 26,000,000 | 34,000,000 | 46,000,000 | 83,000,000 |
| Est. ultimate primary recovery, bbl. | 35,000,000 | 28,000,000 | 100,000,000 | 4,500,000 | 15,000,000 | 9,500,000 | 32,300,000 |
| Est. ultimate recovery by press. maint., bbl. | 70,000,000 | 71,000,000 | 146,000,000 | 12,000,000 | 20,000,000 | 24,000,000 | 41,700,000 |
| Oil prod. by primary methods, bbl. | 16,738,700 | 1,892,700 | 36,277,800 | 514,300 | 10,559,000 | 2,035,900 | 8,375,500 |
| Oil prod. under press. maint., bbl.‡ | 29,391,000 | 14,677,000 | 18,811,600 | 2,228,800 | ... | 560,000 | ... |
| Rec. per lb. press. drop under primary methods, bbl. | 8,450 | 7,430 | 65,650 | 3,905 | 8,500 | 2,310 | 9,100 |
| Rec. per. lb. press. drop to date, bbl.‡ | 24,300 | 75,000 | 80,500 | 1,800 | 8,500 | 2,990 | 9,100 |
| Original bottom-hole press., psi. | 3,520 | 2,920 | 3,465 | 2,344 | 3,821 | 1,280 | 4,406 |
| Press. at beginning of pressure maintenance, psi. | 1,537 | 2,665 | 2,911 | 1,777 | 2,575 | 410 | ..... |
| Latest average bottom-hole press., psi. | 1,618 | 2,699 | 2,780 | 820 | 2,575 | 410 | 3,400 |
| Gas injected to July 1, 1948, M.c.f. | 65,884,000 | ..... | ..... | (¶) | ..... | ..... | ..... |
| Water injected to July 1, 1948, bbl. | 2,727,300 | 18,003,900 | 13,287,100 | (¶) | ..... | ..... | ..... |
| Original gas-oil ratio, cu. ft./bbl. | 760 | 283 | 700 | 400 | 837 | 65 | §8,900 |
| Current gas-oil ratio (gross), cu. ft./bbl. | 3,709 | 400 | 1,160 | 1,273 | 2,020 | 122 | §8,535 |
| Producing wells, Feb. 1, 1949 | 130 | 45 | 108 | 34 | 53 | 70 | 21 |
| Allowable, Feb. 1, 1949, bbl. daily | 9,000 | 7,927 | 12,866 | 1,340 | 4,172 | 5,866 | 4,532 |

*Figures for Arkansas portion of field only. †Bulk of McKamie-Patton production is condensate produced by 21 of the 30 wells in the field. ‡Figures as of January 1, 1949. ¶Figures available only on field-wide basis. §Gas-condensate ratio. Above data taken largely from reports of Arkansas Oil and Gas Commission.

# Discussion of Methods of Cleaning HEAT EXCHANGERS

**by J. S. Connors* and L. J. Weber***

THIS paper on the cleaning of heat exchangers, it is hoped, will serve to emphasize the need for keeping such equipment clean as well as to present some of the more recent developments in the methods used in cleaning. In this paper "heat exchangers" refers generally to tubular equipment classified as shell-and-tube exchangers, kettle elements, overhead condensers, surface condensers, vaporizers, and cooling-tower coil sections. It is not intended, however, that it should be used as a treatise from which the proper chemical solvents or tools can be selected for any specific job. In the case of cleaning with various solvents, the service of an expert should always be secured before any such decision is made. Improper solvent selection or method of operation can be disastrous, resulting in the complete loss of the equipment so cleaned.

In the natural-gasoline industry, there is a general tendency to regard scale formed on the water side of water-cooled heat-transfer equipment as the only source of interference with effective heat transfer. The problem of such deposits is so great that it has overshadowed the effect that the loss of effective heat-transfer efficiency in other equipment has had on the over-all problem of maintaining the lowest possible temperature of the oil being circulated over the absorbers.

For example, in a steam preheater heating 675,000 gal. per day of absorption oil and absorbed gasoline from 310° to 365° F. a theoretical heat-transfer rate of **358** B.t.u. per sq. ft. per hour per °F. could be obtained if the metal surfaces could be kept polished to mirror smoothness, and only true film factors considered. This same equipment, when the fouling factors for commercially clean equipment are applied to the calculation, will provide a calculated effective heat transfer rate of **177** B.t.u. per sq. ft. per hour per °F. If the fouling factor is doubled in operation, due to the deposition of organic matter on the oil side and for corrosion on the steam side, the heat-transfer rate will decrease to **128** B.t.u. per sq. ft. per hour per °F. Similar calculations can be made for both the hot and cold-bank heat exchangers. Therefore, it can readily be seen that even though the oil coolers themselves are clean it may be impossible to maintain low oil temperatures over the absorbers if the other heat exchange equipment is dirty.

*Phillips Petroleum Co., Bartlesville, Okla. Paper presented at second annual Panhandle-Plains regional meeting, Amarillo, Tex., Natural Gasoline Association of America.

### Scale Deposits

It is impossible to evaluate correctly the effect of the thickness of scale deposits on the heat-transfer rate. A thin deposit of loose porous scale or slime may be far more detrimental than a much thicker deposit of hard dense scale. In one specific instance deposition of a wet film of loose uncemented phosphate organic sludge in the water jackets of engines, which could easily be removed by washing with water, resulted in the cracking of several engine heads in 1 month's time. Previous to the change in water treatment, the formation of a hard dense scale, principally calcium carbonate and calcium sulfate, approximately $\frac{1}{16}$ to $\frac{1}{8}$ in. thick, had not caused appreciable damage to the engines.

Nelson[1] classifies scale deposits under three headings according to their detrimental effect on heat transfer as follows:

1. **Hard deposits**—formed by water scale, corrosion products, rust, hard coke, etc.

2. **Porous deposits**—formed by mud and dirt deposited from water or oil, coke and carbon, asphalts and tars, etc.

3. **Loose deposits**—formed by silt and mud, soot, powdered coke, vegetable matter, polymers, slimes, etc.

The third classification is that most detrimental to the heat transfer. Naturally there can be no firm distinction among the three classes of deposits, as the character of the deposits will change with age, and the temperatures to which they are subjected.

### Discussion on Scales

**Ca and Mg carbonates.**—Most water-deposited scales consist principally of calcium and magnesium carbonates. However, in waters which are treated with sulfuric acid, the deposition of calcium and magnesium occurs as a mixture of their carbonates, cemented by their sulfates, the greater the sulfate conversion the greater the quantity of sulfate material. Such deposits are very hard, dense, and relatively insoluble in acid solvents.

Scales consisting principally of calcium and magnesium carbonates can be successfully removed by washing with solutions of inhibited hydrochloric acid (muriatic). Unless the quantity of scale to be removed is large in proportion to the volume of the equipment to be cleaned, the usual initial strength of the acid solvent will be from 4 to 7 per cent HCl by weight.

**Closed coolers.**—In this case the equipment to be cleaned is filled with solution from a reservoir and the solution is then circulated from the reservoir through the equipment and back to the reservoir. As the strength of the acid solution declines the temperature is raised by external heating until an ultimate temperature of approximately 160° F. is reached. Solution circulation is continued at this temperature until analyses show that the acid content will no longer decrease with additional circulation. The acid solution is then drained off and the equipment washed thoroughly with water. It is important that the solution temperature be under control at all times as too high a temperature will result in failure of the inhibitor to protect the metal surfaces from the acid. In addition, if the equipment is not to be returned to service immediately after washing, it should be flushed with a dilute alkaline solution or corrosion will take place.

**Silica.**—The presence of appreciable quantities of silica in waters from which scale is deposited complicates the problem in that the resulting scale is so hard as to be almost glass like, making its removal by mechanical means virtually impossible.

**BEFORE** **AFTER**

*Here are over-all and closeup views of a heavy oil cooler box showing the extent of scale formation on both tubes and supports, and views of the same cooler box after cleaning*

**Absorption oils.**—Originally, these may contain small quantities of tars, asphaltic compounds, and olefins. These small quantities are increased in proportion to the oil volume as the oil losses are made up by the addition of fresh oil. The recent tendency to install direct-fired heat-exchange equipment will complicate the problem of olefin, tar, and polymer content due to the increase in skin cracking which will occur at the tube surface as a result of the higher tube-wall temperature.

When vacuum gases which contain small quantities of crude oil are processed these heavy ends are absorbed and this increases the percentage of organic fouling constituents. In addition, most absorption oils contain small amounts of corrosion products such as iron oxides and iron sulfides which tend to be held by the heavy tars and sludge compounds and to deposit out with them.

**"Coil in box."**—This or similar equipment may be cleaned by spraying the solution over the coils, collecting the solution, and returning it to the reservoir. Periodically solution circulation is stopped and the coils are washed with a high-pressure water stream to remove insoluble sludge. This sludge lying on the coils prevents the acid solution from reaching the soluble scale underneath.[2]

**Atmospheric cooling tower sections.**—These may be similarly cleaned by utilizing a tank to surround the coils while spraying with or immersing in acid. The accompanying photographs show typical results of acid cleaning.

### Chemical Cleaning

When chemical cleaning was in its infancy the usual strength of the acid used was approximately 15 per cent HCl by weight. However, it has since been found that weaker acid solutions are just as effective if solution circulation is maintained for longer periods. In addition, when the quantity of scale to be removed is small in proportion to the volume of solution required to fill the system, use of the weaker acids reduces the wastage. Therefore, the strength of the acid used in a function of the economic balance. In cases where the scale contains considerable quantities of silica, intensifiers are added to the acid. In some cases these intensifiers consist merely of 1 to 3 per cent of hydrofluoric acid (HF). Such intensified solutions are hazardous to use, with respect to both personnel and equipment.

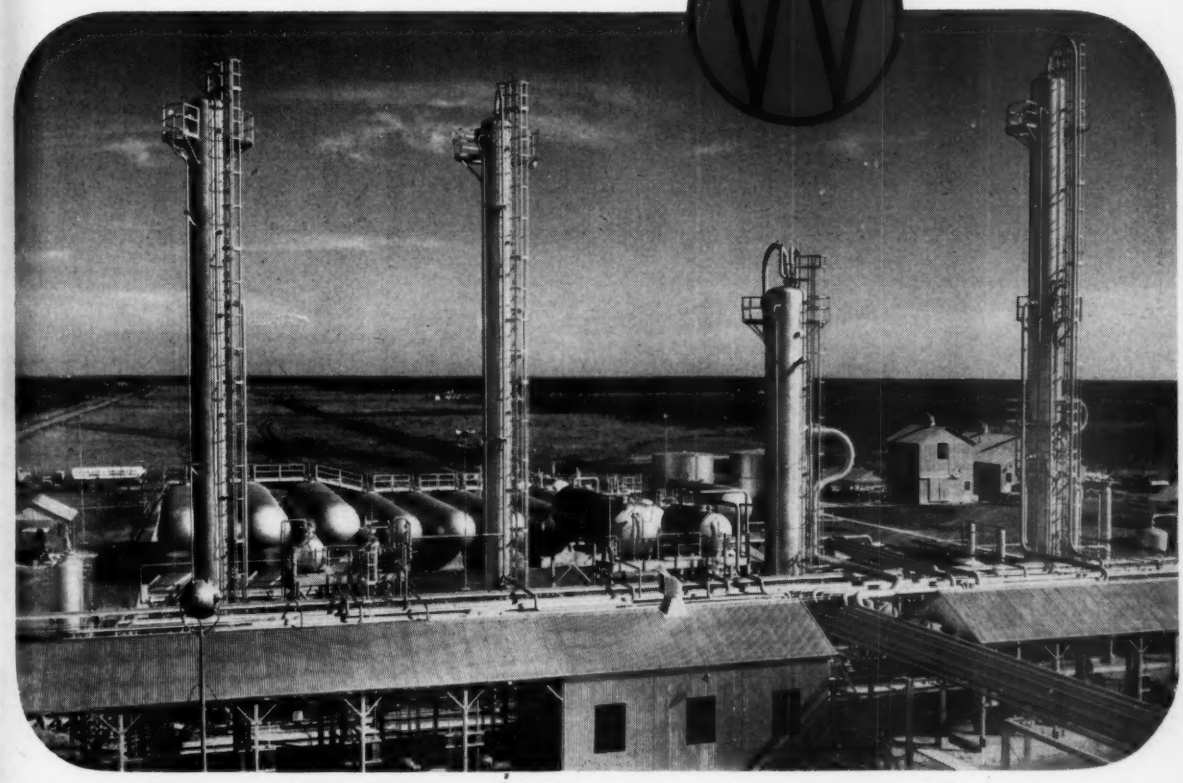
Scale consisting of calcium and magnesium carbonates cemented by their sulfates or the true sulfate scales can be removed chemically by two-stage cleaning. In the first stage the equipment to be cleaned is treated with a solution containing from 5 to 7 per cent sodium carbonate at a temperature of approximately 212° F., or higher if a pressure system is used. The first stage cleaning will dissolve the sulfate cementing bond. Solution is circulated until analyses show that the sulfate content will not increase with additional circulation.

The alkaline solution is then drained and the equipment washed thoroughly with water at high velocity. After water washing, the equipment should be inspected to determine whether the tubes are stopped up with sludge. If not stopped up, the equipment is then washed with acid in one of the procedures described previously. If oil is present in any considerable quantity in the original scale, the initial alkaline washing solution should contain a good detergent or wetting agent to permit the infiltration of solution through the oil so that it can attack the scale.

J. L. Wasco and F. V. Alquist[3] were among the first to discover that very hot alkaline solutions would remove a sulfate scale. They used strong caustic solution containing from 30 to 50 per cent sodium hydroxide at temperatures ranging from 150° to 200° F. Later investigations have shown that the weaker solution of sodium carbonate is just as effective and less costly than the stronger.

Organic scales and scales consisting of dirt cemented by organic material have been successfully removed by selected organic solvents or by combustion of the deposits. Other such deposits have been successfully removed by passing hot steam through the equipment at high velocity fol-

# *For* STABILIZATION



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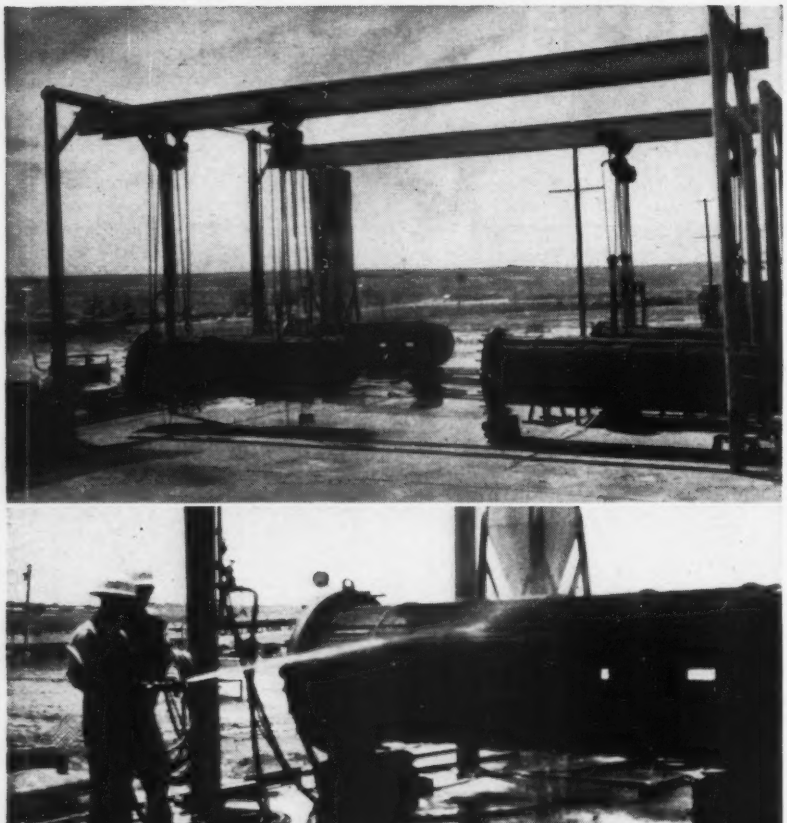


*Top view shows the tube-bundle cleaning area. Hoists simplify handling operations. After burning with hand torches, scale is flushed with water spray, as shown immediately above*

lowed by high-velocity water washing.

Polymer deposition on condenser tubes in a butadiene plant, for example, had previously been removed by "burning out" with mixtures of steam and hot air. It has been proved that a selected organic solvent will remove this polymer.[4] The preferred procedure is as follows:

1. Shut the hydrocarbon out of the unit.
2. Completely fill the shell with organic solvent and allow the bundle to soak for 24 hours.
3. Blow the solvent out and then pull and steam clean the bundle.
4. Follow the steaming with a high-velocity water wash to remove the polymer loosened by the steam.
5. Replace the bundle and put the condenser back in service.

It has been found that such a procedure will suffice to clean some tube bundles much better than the old method of burning out.

### Inhibitors for Acid Cleaners

Acid-solvent cleaning, when the proper inhibitors are used, will not damage the equipment if the temperatures are adequately controlled. However, when the equipment has been subjected to corrosion prior to or during the scale-formation period the use of solvent cleaning is questionable. The virtually complete removal of all scale and corrosion product will result in opening any pinholes caused by corrosion but covered with scale. Many times the leakage developed after chemical cleaning has caused the operator to assume that the solvent corroded his equipment and he has condemned the process, whereas actually the fault lay in the choice of solvent cleaning in the first place. Unless the physical state of the equipment is known, a mechanical cleaning test should be made to determine the extent of previous corrosion before the final choice is made to use solvent cleaning.

Selection of inhibitors for any solvent which will protect the various metals is quite wide. The first, and one of the best from the inhibition standpoint, were the arsenious oxides. Their use is not favored today because of the extreme toxicity of the arsenic compounds. Formalin was another of the earlier inhibitors and it is still frequently used. S. T. Powell[5] has prepared a table of various inhibiting substances. In addition, there are many commercial inhibitors on the market such as the Rhodines and the DuPont inhibitors.

### Mechanical Cleaning

Mechanical cleaning, over a period of years, has become somewhat standardized as to method. Such cleaning usually involves removal of the tubular element to some working place where steam, air, and water are available or, in the instances where the element cannot be brought to a shop, by bringing such facilities to the operating unit. Since many mechanical cleaning methods require handling of the tube bundles, properly designed slings and hoists should always be used to prevent injury to the tubes.

**Internally cleaning tubes.** — Some operators have resorted to driving pipes or rods through the tubes, a practice which is not very effective in removing scale and one which may serve only to compact the fouling material and to damage the tubes.

A better method is that of using a water or steam lance pushed through the tubes to loosen and flush out the scale. If the scale is too hard to be removed in this way, the lance may be fitted with a spiral drill and rotated, while at the same time the flushing medium is caused to flow around the drill. A stuffing box located at the outboard end of the lance, or drill handle, serves to introduce the water or steam to the passage through which it flows to the drill, and permits rotation of the handle by means of an air or electric motor without tangling of the supply hose. Accessories for the handle, such as the drill, wire brush or jet head, and stuffing box, are available from several manufacturers.

**External surfaces of tubes.**—Success of mechanical cleaning of this type is largely a matter of accessibility since designers, who have seldom been faced with the trying job of bundle cleaning, are prone to put as many tubes as possible into a tube sheet of given diameter. External cleaning is often aided materially by thorough air drying of the bundle, because many types of scale loosen and fall off when dried.

For more stubborn material, it is common practice to rap the tubes with lightweight chisels or hammers, and to remove scale from exposed and accessible tubes by wire brushing. The interior tubes in bundles of any size cannot be reached in this manner, making it necessary to use long-bladed, coarse-tooth wood saws to reach in between tubes. The saws used for this operation should have very little set to the teeth or they will score metals such as soft steel or admiralty.

**Sandblasting.**—Another method, to be used with caution, is that of sandblasting the tubes with a special nozzle. The nozzle is made by flatten-

ing one end of a piece of pipe and then drilling a number of small holes in it at the sides of the flattened end. This nozzle, which sprays air and sand in a flat pattern parallel to the tubes, can be used only if there is sufficient space between tube rows for insertion into the bundle. The same nozzle can be used with high-pressure steam, air, or water for removal of looser scale.

**Thermal shock treatment.** — This method (one case of which was discussed previously) will often quickly and cheaply remove the major portion of some types of scale from a bundle, and in certain equipment such as cooling-tower coils this operation can be carried out without dismantling. If the fluid on one side of a tube is normally hot, while that on the other side is relatively cool, then by merely shutting off the flow of fluid either around or through the tubes, a rapid temperature change will occur in the tube metal. Repeating the procedure quickly a few times and thereafter at regularly scheduled intervals often prevents the accumulation of thick, continuous scales. This fact is taken advantage of in the design of some types of self-scaling feed water evaporators, and in the design of bent-tube exchangers.

For more pronounced thermal shock cleaning the tube bundles are taken out of the equipment and mounted on slings, after which either the regular head or a test head is installed. Water and steam are manifolded to the nozzles through quick-opening valves, by means of which the bundle can be heated to steam temperature and then quickly quenched to water temperature. The water and steam flowing through the bundle are wasted to the drain.

**Organic films.** — Most unsaturated hydrocarbons will form polymers if subjected to heat in the presence of oxygen. Some types of organic films such as furfural or butene polymers can be partially oxidized, after which, washing with high-pressure water will remove practically all of the residue. This type of treatment has proved to be successful for some organic scales which were unaffected by any chemical solvent which could be used without fear of seriously corroding the tube metals.

Certain organic films act only as binders for dirt, rust, or other inorganic matter comprising the mass, and these burn with difficulty, while others consisting almost entirely of highly combustible material must be burned under control to prevent overheating and consequent damage to the tube elements. This control, when the burning is started and maintained by hand-manipulated torches, is accomplished by allowing steam to flow through the tubes while the burning is progressing.

A good deal of training and experience, as well as close attention by the torch handler, is required to prevent damage to bundles when burning off, and this is especially true in the case of admiralty tubes. The steam inside the tubes is under pressure, and tubes will rupture or become warped from local expansion if the torch is allowed to remain too long in any one spot on the bundles.

**Burning furnaces.** — At least two companies have built tube-bundle burning furnaces, by means of which polymers or combustible fouling material can be oxidized in controlled atmospheres. These furnaces are large enough to house the bundles, which are charged and removed on special rail cars with suitable cradles. Furnace atmosphere is controlled at from 10 to 15 per cent excess air, and during the burning operation steam can be circulated through the tubes of the bundle.

In operation, the furnace temperature is slowly raised to 850° F. and maintained at this temperature for an extended period of time, and then slowly cooled to about 300° F., at which time the burners are shut out. It is necessary to maintain the fouled bundles at 850° F. for from 4 to 24 hours, depending upon the type and extent of the fouling, with an estimated 16-hour period required for an average polymer 1/16 in. thick. Admiralty tubes cleaned by the furnace method must be rerolled in the tube sheets after burning, since annealing of the tube ends causes loosening of the tube-to-tube sheet joint. The advantage of furnace burning over exposed manual burning is in the better control and less likelihood of damage to tubes, but this method is justified only in plants having large numbers of elements which foul with combustible materials.

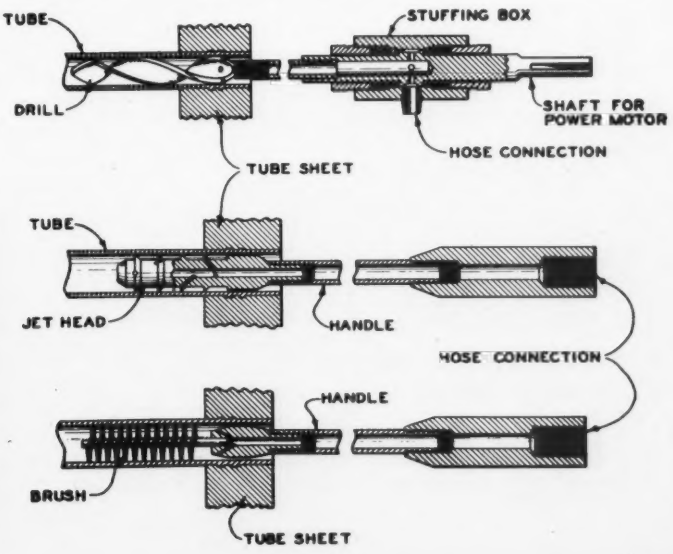
### Removal of Tube Bundles

Removal of large tube bundles which are badly fouled is always difficult, and for this reason clearances between the tubes and vessel nozzle or exchanger shell should be as generous as possible to minimize interference. The tube sheet should be provided with tapped holes for jack screws, and both tube sheet and head should have integral lifting lugs. While it is cheaper to use flat-faced tube sheets, much better holding of the head gasket is obtained if the tube sheet and the head dovetail together.

The head baffles and baffle portion of the head gasket are subjected in service to the fluid pressure differential from inlet to outlet. When

*(Continued on page 93)*

*Left: Here the operators are using an internal reaming and flushing tool to clean one of the smaller tube bundles. Right: Various types of internal reaming and flushing tools used for cleaning heat-exchanger bundles*



# *On Drilling Bids—*

# Use Close Estimates—

## Not Loose "Guesstimates"

**Cost estimates for framing drilling contract bids should include all applicable items. Sometimes "extras" besides straight footage and day-work changes may enter the deal. The "check-chart" below includes all major items incorporated in a complete turn-key job.**

### A. LOCATION EXPENSE

1. Clearing Location $ .....
2. Roads and Bridges $ .....
3. Crop-Land Damages $ .....
4. Cellar, Derrick Corners, Etc. $ .....
5. Drilling Derrick—Up $ .....
6. Dig Pits $ .....

### B. MOVING-IN EXPENSE

1. Trucking (Time Rate) $ .....
2. Trucking (Contract) $ .....
3. Rigging Up—Labor $ .....
4. Rigging Up—Other $ .....
5. Watchman $ .....

### C. DRILLING EXPENSE

1. Wages—Rig Crews $ .....
2. Wages—Truck Drivers, Helpers, Etc. $ .....
3. Salaries—Sup'ts., Pushers, Office $ .....
4. Wage Taxes—S.S., Unemployment $ .....
5. Transportation—Crews $ .....
6. Insurance—Workmen Compensation $ .....
7. Insurance—Other $ .....
8. Insurance—Liability $ .....
9. Fuel $ .....
10. Fuel Line $ .....
11. Lube Oil $ .....
12. Greases $ .....
13. Water $ .....
14. Water Line $ .....
15. Water-Well Equipment $ .....
16. Drag Bits $ .....
17. Rock Bits $ .....
18. Diamond Bits $ .....
19. Core Bits $ .....
20. Reamers $ .....
21. Whipstocks $ .....
22. Core Barrels $ .....
23. Rental Tools $ .....
24. Well Surveying $ .....
25. Fishing Tools $ .....

### D. OUTSIDE SERVICE EXPENSES

1. Drilling Water Well $ .....
2. Mud Supervision $ .....
3. Cementing Surface $ .....
4. Cementing Inter. String $ .....
5. Cementing Oil String $ .....
6. Plastic Services $ .....
7. Welding $ .....
8. Setting Whipstocks $ .....
9. Electric Logs $ .....
10. Core Analyses $ .....
11. Drill-Stem Testing $ .....
12. Gun Perforating $ .....
13. Acidizing $ .....
14. Shooting $ .....
15. Drilling-In Tools $ .....
16. Swabbing-Cleaning Out $ .....
17. Erect Pumping Derrick $ .....
18. Pump Unit Foundation $ .....
19. Setting Surface Equipment $ .....
20. Grade Work-Tank Setting $ .....
21. Running Tubing and Rods $ .....

### E. MOVING-OUT EXPENSE

1. Trucking (Time Rate) $ .....
2. Trucking (Contract) $ .....
3. Tear Down—Labor $ .....
4. Tear Down—Other $ .....
5. Watchman $ .....
6. Drilling Derrick—Down $ .....
7. Fill Pits—Restore Land $ .....
8. Pulling Casing $ .....
9. Plugging Expense $ .....

### F. REPLACEMENTS EXPENSE

1. Wire Line $ .....
2. Rotary Hose $ .....
3. Brake Lining $ .....
4. Swivel $ .....
5. Hoist and Drives $ .....
6. Engines $ .....
7. Light Plant $ .....
8. Shale Shakers $ .....
9. Pipe Fittings, Etc. $ .....
10. Drill-Pipe Protectors $ .....
11. Subs $ .....
12. Drill Collars $ .....
13. Rotary Table $ .....
14. Slush Pumps $ .....
15. Blowout Preventers $ .....
16. Rig Tools $ .....
17. Hand Tools $ .....

### G. CEMENT, FOUNDATIONS MATERIAL EXPENSE

1. Surface Casing: Size ..... Grade ..... Ft. ..... $ .....
2. Casing: Size ..... Grade ..... Ft. ..... $ .....
3. Casing: Size ..... Grade ..... Ft. ..... $ .....
4. Casing: Size ..... Grade ..... Ft. ..... $ .....
5. Casing: Size ..... Grade ..... Ft. ..... $ .....
6. Cement, Foundations $ .....
7. Cement, Surface String $ .....
8. Cement, Inter. String $ .....
9. Cement, Oil String $ .....
10. Casing Shoes and Floats $ .....
11. Centralizers and Scratchers $ .....
12. Hangers and Liner $ .....
13. Drilling-In Fluid $ .....
14. Tubing: Size ..... Grade ..... Ft. ..... $ .....
15. Packers $ .....
16. Pumping Derrick $ .....
17. Rods: Size ..... Grade ..... Ft. ..... $ .....
18. Polished Rod $ .....
19. Bottom-Hole Pump $ .....
20. Casing-Head Equipment and Valves $ .....
21. Well-Head Fittings $ .....
22. Flow Lines $ .....
23. Flow Line Fittings and Valves $ .....
24. Tanks: No. ..... Size ..... $ .....
25. Separators $ .....
26. Tank-Sepr. Conns. and Fittings $ .....
27. Pumping Unit $ .....
28. Pump Engine House $ .....
29. Pump Prime Mover $ .....
30. Power Unit Drives $ .....
31. Delivery Charges on Well Material and Equipment $ .....
32. Paint $ .....

### H. DEPRECIATION EXPENSE

1. Drill Pipe $ .....
2. Drilling Equipment $ .....
3. Cars, Trucks, Etc. $ .....
4. Miscellaneous $ .....
5. ..... $ .....

### I. MISCELLANEOUS EXPENSE

1. Field Office Supplies $ .....
2. Telephone-Telegraph $ .....
3. Tool Car Expense $ .....
4. Safety and First Aid $ .....
5. Taxes on Tools and Equipment $ .....
6. Miscellaneous Expense $ .....

### SUMMARY

| TYPE EXPENSE | Est. Cost |
|---|---|
| A. Location | $ ..... |
| B. Moving In | $ ..... |
| C. Drilling | $ ..... |
| D. Outside Service | $ ..... |
| E. Moving Out | $ ..... |
| F. Replacements | $ ..... |
| G. Materials | $ ..... |
| H. Depreciation | $ ..... |
| I. Miscellaneous | $ ..... |
| J. Total: | $ ..... |
| Per Foot: TD ..... Ft. | |
| If Less Items | $ ..... |
| Per Foot: TD ..... Ft. | |
| Day Work Rate (24 Hrs.) | $ ..... |

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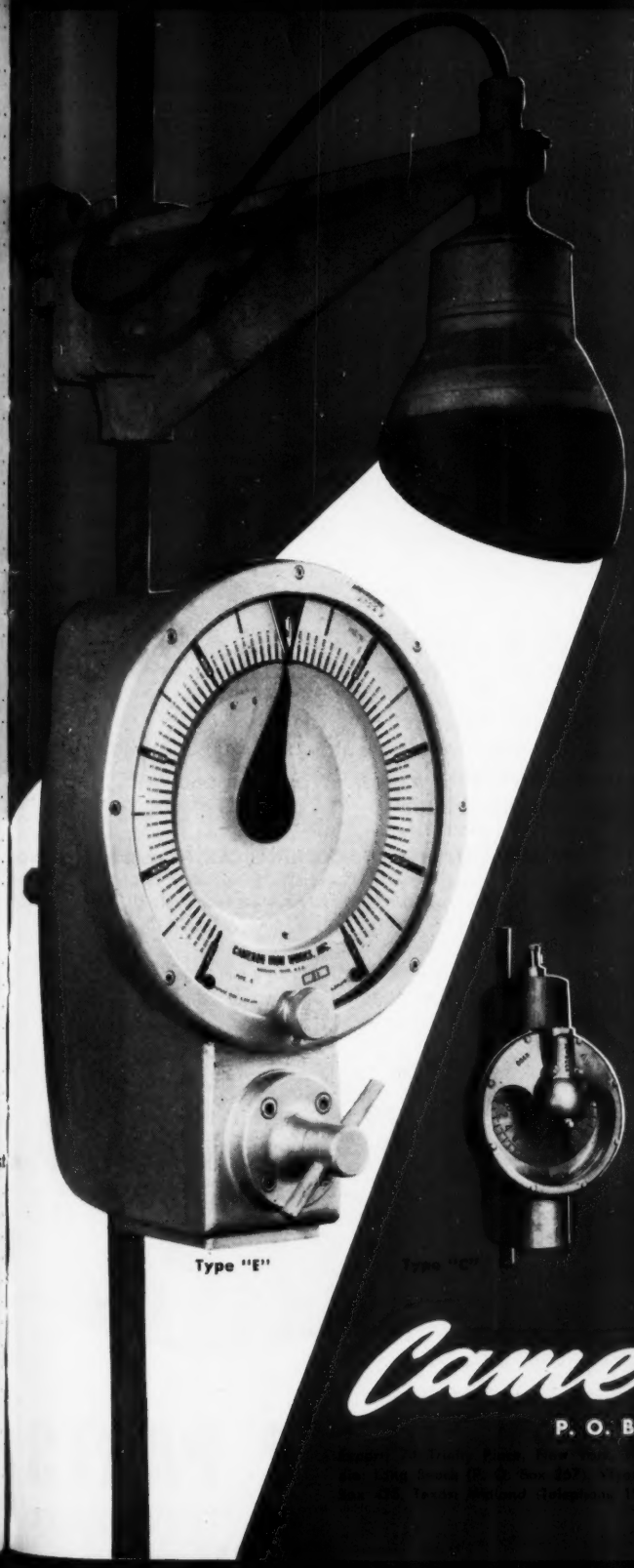
# WEIGHT-ON-BIT



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It is a "differential" type indicator in that it shows in pounds the slightest change in weight on the bottom end of the drill pipe. The instrument clamps on the dead line in the conventional manner. With all of the pipe run in the hole, and with pumps running and rotary turning, the pointer is set at zero. As weight is slacked off on the bit, the pointer swings to the left to indicate directly in pounds the load being carried by the bit. A movable target is set at the desired weight and it is only necessary for the driller to keep the pointer and target in alignment.

The dial is calibrated to 40,000 lbs. on either side of zero, figures on the left hand side indicating weight on bit, figures on the right hand side indicating weight added to the string. The latter feature makes the Type "E" Weight Indicator particularly desirable for fishing operations.

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# GROUND WATER

## . . test methods for wells and maintenance of screens

**by John B. Millis** *

IN the development of ground-water supplies, the completion of a well will be successful generally if three principles are considered after the necessary testing has been completed. First, the proposed well should be constructed of those materials which will have the longest life under the soil, water, and pumping conditions present. Second, the proposed well should be so constructed that the maximum quantity of water is available for pumping, with the least possible drawdown per gallon. Third, the proposed well should be so constructed that only desirable water can enter. If these three basic conditions are kept in mind in selecting the proper type well completion, many failures will be avoided. The tentative standards of the American Water Works Association provide detailed information on water-well construction.

A yield test of a water well is an indication of the producing value of the aquifer or aquifers, at the time the test is conducted. The test should show the relation of water production at different rates to the pumping levels—this is a basic characteristic of any well. All future yield tests can be compared to indicate any change in the well characteristic. Too frequently, a well is put on production and no further thought given to it until failure occurs.

*1955 East 73rd Place, Chicago. A companion article by the author on this subject appeared in The Oil and Gas Journal issue of February 24, 1949.

### Calculation of Flow Rates

Two generally accepted formulas are found in Turneaure and Russell's book, "Public Ground Water Supplies" (John Wiley & Sons). For a confined aquifer, Formula 1 is employed in calculating the flow of water into artesian wells.

$$Q \text{ (gal. per min.)} = 2 \times K \times t \times (H - h) \div \log_{10} R/r \quad (1)$$

Formula 2 may be used to calculate water table well flow rates in an unconfined aquifer.

$$Q = K (H^2 - h^2) \div \log_{10} R/r \quad (2)$$

"K" is obtained from Table 1 (below)

t = Total thickness of all water-bearing strata (ft.)

H = Depth of water in well when not pumping (ft.)

h = Depth of water in well when pumping (ft.)

R = Radius of circle of influence (ft.)

r = Radius of well bore (ft.)

**TABLE 1—VALUES OF "K" (PERMEABILITY COEFFICIENT)**

| Porosity per cent | 0.10 mm.* very fine | 0.20 mm.* fine | 0.30 mm.* medium | 0.40 mm.* coarse |
|---|---|---|---|---|
| 25 | .046 | 0.19 | 0.41 | 0.75 |
| 30 | .094 | 0.37 | 0.84 | 1.49 |
| 35 | .164 | 0.68 | 1.47 | 2.64 |
| 40 | .233 | 0.94 | 2.20 | 3.76 |

*Sieve analysis (millimeters) of well cuttings. At least 90 wt. per cent retained on screen.

**TABLE 2—VALUES OF $\log_{10}$ R/r FOR VARIOUS VALUES OF "R" AND "r"**

| | R=1000 ft. | R=500 ft. | R=100 ft. |
|---|---|---|---|
| 8-in. well | 3.48 | 3.18 | 2.48 |
| 10-in. well | 3.38 | 3.08 | 2.38 |
| 12-in. well | 3.30 | 3.00 | 2.30 |
| 16-in. well | 3.18 | 2.87 | 2.18 |
| 24-in. well | 3.00 | 2.70 | 2.00 |

**Example:** Estimate the flow rate of a confined water-bearing formation using the following data:

Classification of cuttings — "Fine" (20 mm.)

Porosity—30 per cent.

$K = 0.37$ from Table 1

$t = 300$ ft.

$H - h = 100$ ft.

"r" = 6 in.

$\log_{10} R/r = 3.30$ from Table 2

$Q = 2 \times 0.37 \times 300 \times 100 \div 3.30 = 6{,}730$ g.p.m.

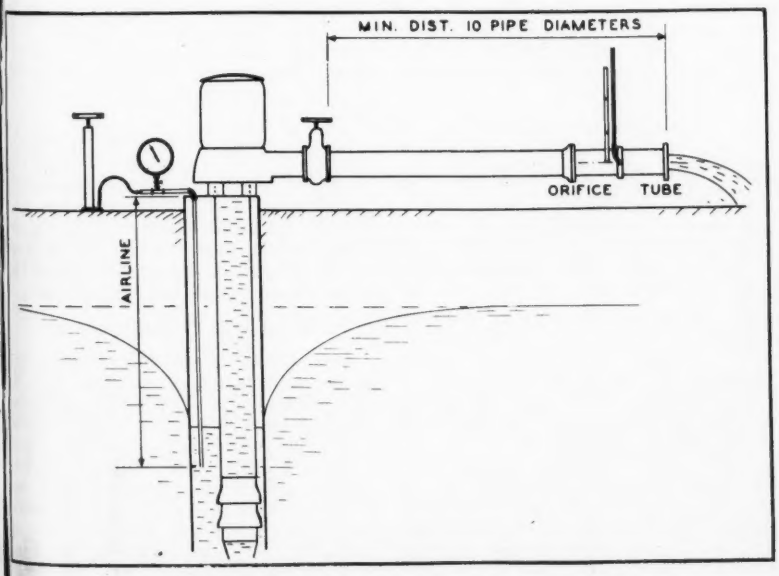


*Fig. 1—Well arranged setup for water production capacity test*

### Measuring Flow Rates

Various instruments may be employed to measure water-well production rates. One method is illustrated in Fig. 1. When testing a large number of wells over a wide range of capacities, two or three sizes of orifice tubes with proper plates will be required. A thermometer for recording variations of water temperature should also be part of the testing equipment.

A dial-type recording flowmeter is often desirable to record the rate of pumpage and total pumpage for each 24-hour or 7-day period. The visual-dial type is often favored because an operator will note changes and report them on the daily record, where-

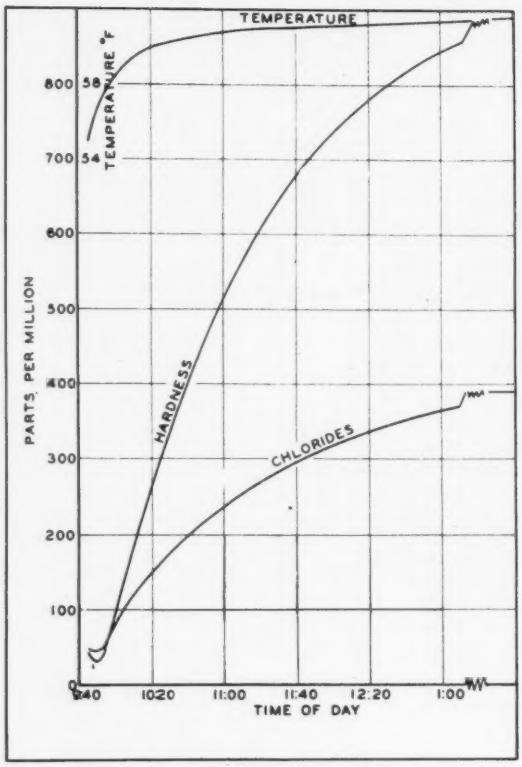


*Fig. 2—Effect on water character for a well producing from multiple formations*

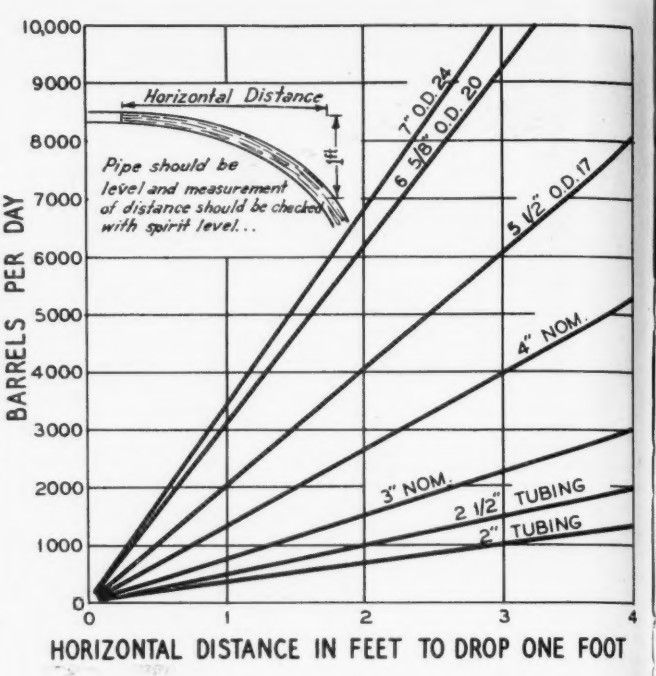


*Fig. 3—This graph provides a method of estimating rate of discharge from a pump when no measuring instruments are available. (Furnished by K. A. Covell, chief engineer of production, Pure Oil Co.)*

as, on the recorder type, the records may be filed without any detailed study. Weakness or failure of the well will be evidenced more readily by the "air line" gage and flowmeter than elsewhere.

A reference curve that should be plotted from the data collected in the original acceptance test of well is the "time of recovery" curve. Before the test the nonpumping water level is determined (during test, the final dynamic water level is noted) and after the test is completed, the rate of return of the water by minutes to the original nonpumping water level should be recorded. A recovery curve should be made at least once a month. A comparison of these data will indicate the condition of the aquifer or the well screen at the well bore. Increasingly slow recovery indicates clogging of the formation or incrustation on the screen.

### Well Characteristics

Characteristics of wells producing from more than one sandstone is a change in temperature with change in rate of pumpage, because of change of head on the production from each formation. In such case the data are interpreted to show that the capacity of one of the aquifers has been affected more than that of another. If the temperature of waters in various aquifers are known, then the temperature of the water obtained can often roughly indicate its sources. A characteristic mineral composition is very often a specific indication of the water source.

The specific capacity of gravel wells varies considerably from one location to another. Such wells are usually of shallow depth and have a low cost of construction and operation compared to the possible volume of water which can be obtained. If the gravel bed supporting the production is coarse, extensive, and subject to recharge, large supplies of water can be developed; therefore, such possible source should be given primary consideration.

### Production Practices

A term in common use when referring to sand and gravel wells, is "specific yield" which is expressed in per cent. The cubic feet of water pumped divided by the cubic feet of formation dewatered represents specific yield values.

It is often considered good practice (where the supply is sufficient) to operate a well at one-half its tested capacity. This is particularly true in unconsolidated materials in order to reduce the flow velocity at the point of entrance to the well bore.

With regard to the operating efficiency of deep-well turbine pumps, it may be stated that the average unit should use somewhere between 450 and 500 kw.-hr. per million gallons, pumped 100 ft. high. Each 5 per cent loss in efficiency, with power purchased at 1 cent per kw. hr., assuming substantially continuous operation, will cost $150 per year per million gallons, pumped 100 ft. high. The correction of but 5 per cent loss in efficiency will usually pay at least 25 per cent in a short time return on the cost of new bowls or the rehabilitation of the old equipment.

All deep-well turbines should be frequently checked for wire-to-water efficiency. Such a check should also be made before pulling the unit for inspection. When wire-to-water efficiency falls below 60 to 55 per cent, it will usually pay to overhaul the unit.

Where the demand is too great for one aquifer, it may be possible to secure the supply from two different aquifers, eliminating interference between wells. Conditions resulting in interference can also be minimized by drilling new wells sufficiently far away to minimize the interference.

### Treating of Fouled Screens

Acid treatment of well screens has been reasonably successful. C. H. Groom and J. T. Browning ("Technical Aspects of Water Well Acidizing," The American City, October 1947) give four basic reasons for decrease in water production: (1) a decrease in available water, (2) a faulty pump due to worn parts, corroded parts, or a dirty pump screen, (3) corrosion products and scale incrustations on the screen and formation,

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(4) fouling of the screen and formation by sand and silt.

The use of Calgon also has been shown to be an effective method of rehabilitation for porous concrete screens. Prior to inauguration of treatment, the wells at one plant had a life of 4 years, or a loss in capacity from 500 to 20 g.p.m., equivalent to about 2 per cent loss per month. Since this treatment has been used, a well drilled in 1935, originally producing 500 g.p.m., now produces 170 g.p.m., or a loss in production of approximately ½ per cent per month, or the life term of the well has been increased from 4 years to more than 10 years.

The present treatment is conducted once a year over a period of 10 days. Each treatment consists of a dosage of the well with 20 lb. of Calgon, 2 lb. of soda ash, and 5 lb. of Santobright. The application is surged three times and flushed. This treatment is conducted for 5 consecutive days, and after waiting for 1 to 2 days, another series of applications is made over a period of 5 additional days.

**FOUR TYPES OF FOULING IN WATER PUMP SCREENS**

1. **Lime.**—(Calcium carbonate sometimes with a small percentage of magnesium carbonate, fine to coarse sand.)

These deposits are caused by a rapid drop in pressure such as that occurring at the well screen. The deposits are probably the most prevalent type, and should all respond to acid treatment when present as incrustants on the screen, in sandstone, or in crevices in dolomite. Action of the acid is to dissolve and remove the lime and also loosen any silt or fine sand.

2. **Iron.**—This deposit is found often with lime but particularly when the pumping level is near or below the top of the screen. Iron oxide can be dissolved by acid treatment.

3. **Slime deposits.**—(An accumulation of living or dead microorganisms or bacteria, forming rubbery or gelatinous deposits.)

Accumulations occur in waters containing ammonia or iron, even in low concentrations. They are more prevalent in the presence of air, particularly where the pumping level approaches and recedes below the top of the screen or top of the contributing formation, or where water drops through air from one depth in a well to pumping level.

Treatment with acid or any chemical does not dissolve this slime. Its removal must be accomplished by freeing it from the metal or the formation. One method is to dry it, or acid may loosen some of the slime by solution of the iron which is present. Periodic treatment with chlorine has been shown to be effective. Results from this treatment are not permanent and there will be a limit as to how many times the screen can withstand this treatment before it is weakened. The use of steam particularly with lye or caustic may offer a solution.

4. **Silt and fine sand.**—Fouling due to these ingredients may be the result of any of a number of causes. It may be due to the character of the producing formation itself. It can be caused by overpumpage resulting in lateral movement of sand caused by the water itself, or partial dewatering of the gravel bed below a clay layer immediately surrounding the well. Mechanical treatment or a new well may be the only solution for this type fouling.

## Records and Tests

A quality-source test involves the pumping of a unit for 2 hours or longer. During this period static water level, dynamic water level, temperature, are measured and eight 1-qt. samples are obtained.

The time that the samples were collected and information as to normal operation of unit are recorded. The pumping unit should be shut down preferably 12 hours before the test is made. The particular well from which the quality source data, Fig. 3, was obtained is 1,625 ft. deep, drilled through sandstone, and cased to bedrock. The test indicates that the water first obtained originated in the top limestone formation, such source having a high head but low capacity; and as time elapsed, waters from the lower aquifers having a low head but high capacity were obtained. Such tests are of value to determine the relative sources of water from any well which penetrates more than one formation.


## Acknowledgment

Acknowledgment is gratefully given for the assistance and suggestions of R. H. Carr, chief engineer of production research, and Theron Wasson, chief geologist, Pure Oil Co., Chicago; and E. W. Bennison, engineer, Edward E. Johnson, Inc., St. Paul.



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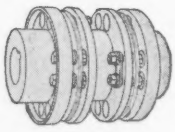

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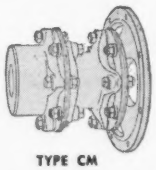

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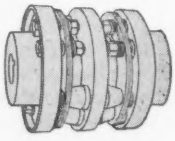

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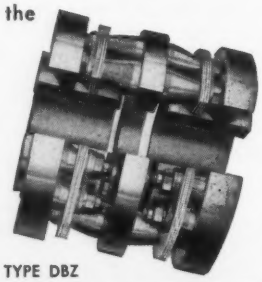

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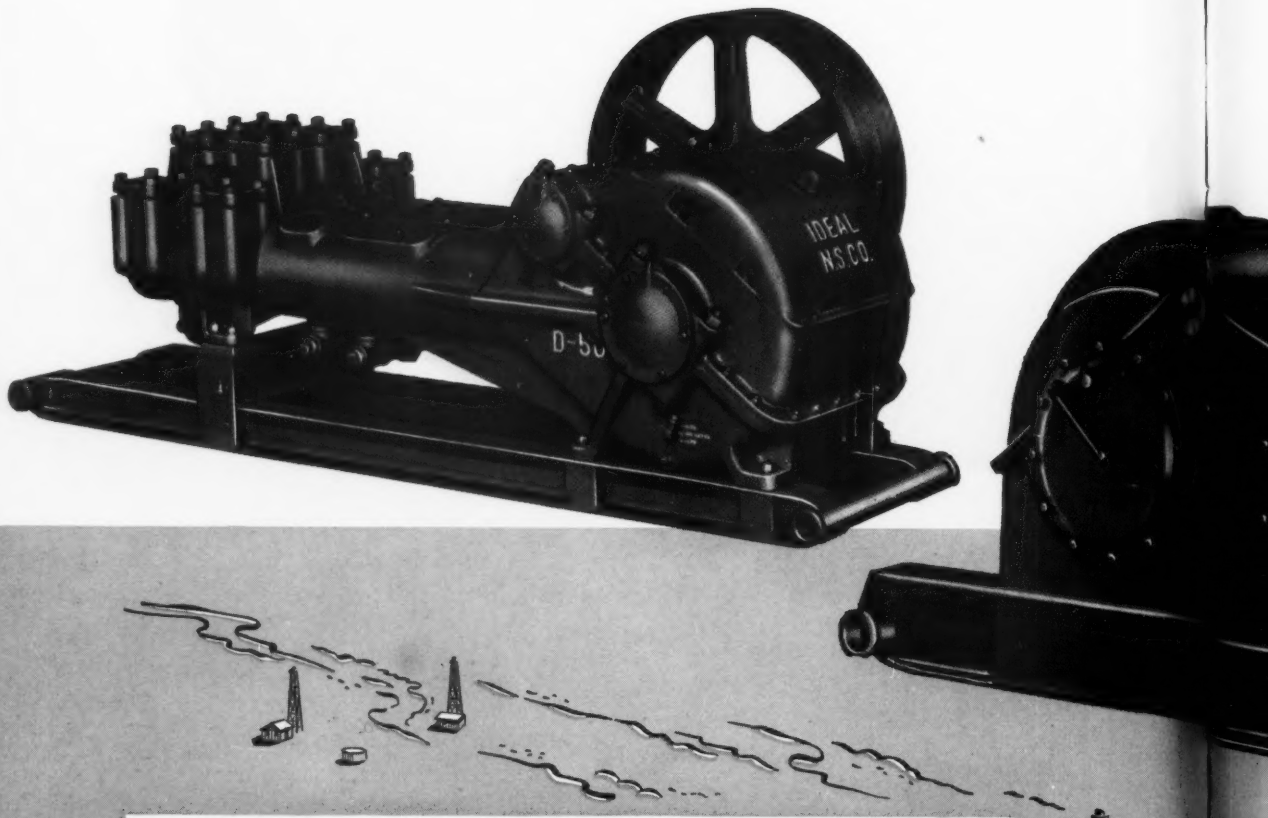


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| C-150 | 185 | 160 |
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| C-350 | 495 | 420 |
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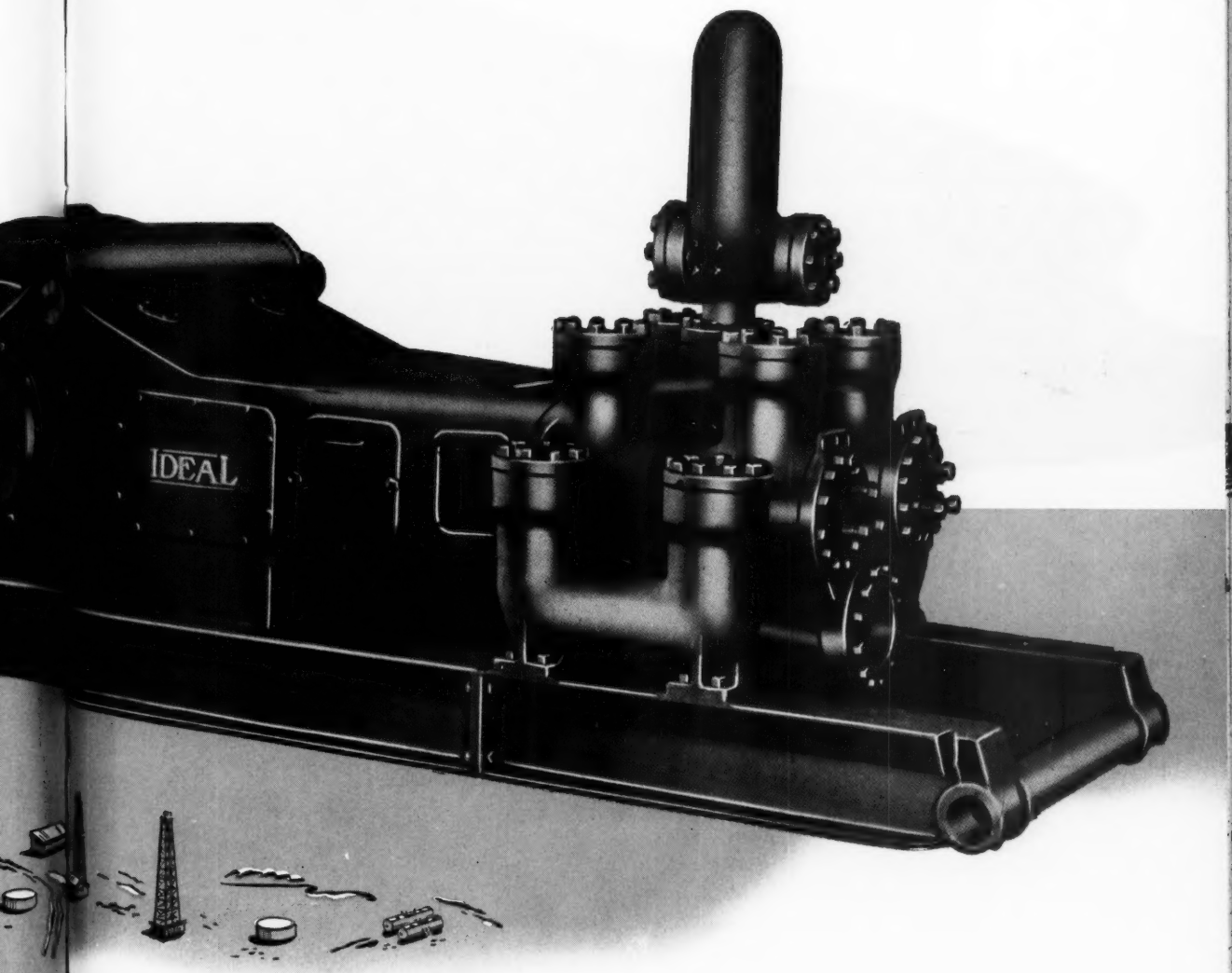


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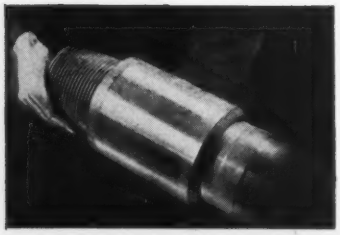

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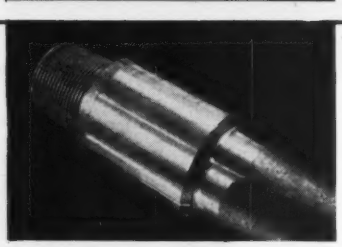

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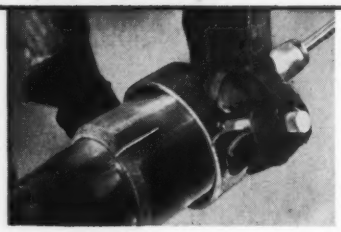

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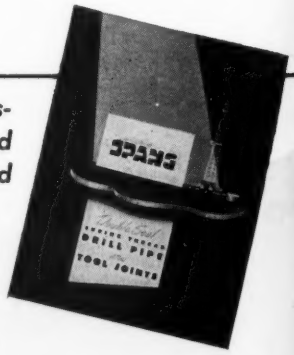


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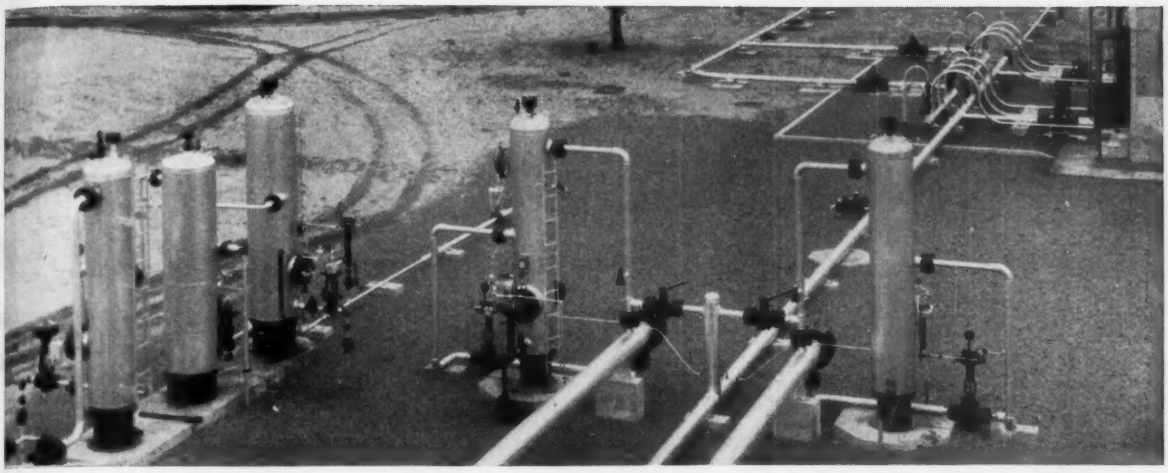
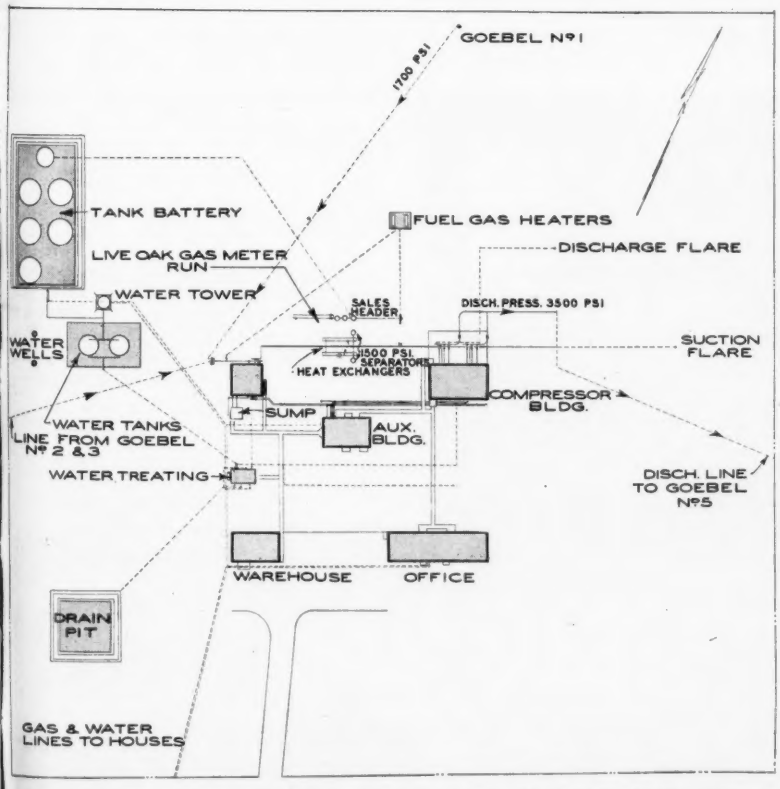


*Sales separators for the Goebel plant can be seen at the left. In the right foreground are the two high-pressure separators and heat exchangers to prevent the formation of hydrates. In the background can be seen suction and discharge headers entering compressor building*

# Cycling Applied to Three-Well Field in South Texas

***by Leigh S. McCaslin, Jr.***




*Plot plan of the Western Natural Gas Co. cycling operation. The field is 65 miles northwest of Corpus Christi*

WESTERN NATURAL GAS CO., Houston, has found it economical to install cycling facilities in a three-well field in Live Oak County, Texas.

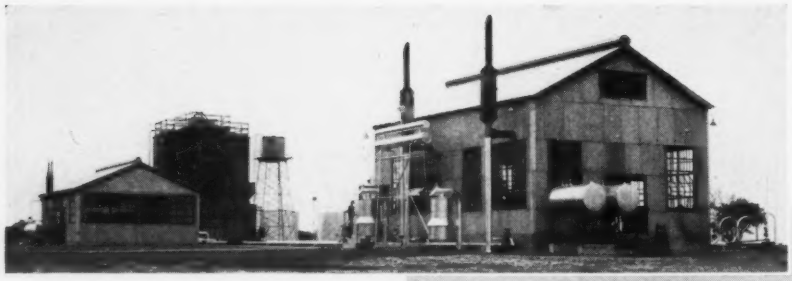
In Goebel field, Western has put into operation this year a 1,200-hp. plant with a capacity of 30,000 M.c.f. of gas daily. All gas produced from the field's three wells is being returned to the formation through a single input well with injection pressures of around 3,200 psi. Goebel field is producing 15,000 M.c.f. of gas and 300 bbl. of distillate daily from Wilcox sand pay at 7,000 ft.

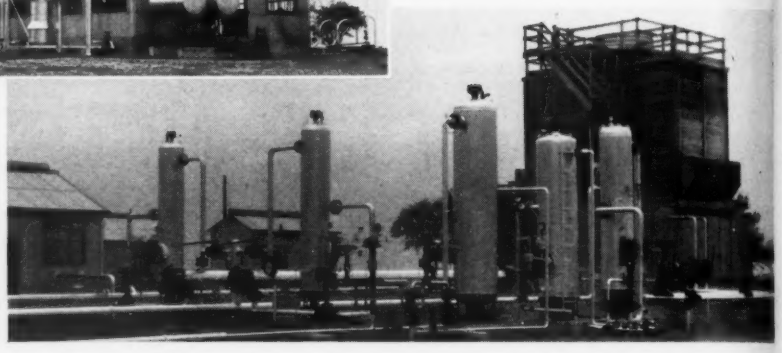
This plant becomes more significant in view of the increasing emphasis on gas conservation—both by state regulatory bodies and by the oil operators. However, it does not necessarily follow that any three-well field similar to Goebel will justify cycling operations. Several factors, in addition to the field characteristics, have affected the "payout" on the plant.

In the first place, the compressors in this operation are salvage from a similar installation in another field. This field had reached its economic limit from a cycling standpoint and a market was found for the field's gas. Hence, it was possible to move the compressors from this field to Goebel. Secondly, Western Natural has other properties in the area which it expects to tie into the new plant in the future. With only 15,000 M.c.f. going through it, the plant is operating at only 50 per cent capacity at present.

### Two 600-hp. Compressors

Gas and distillate leave the three wells at 1,700 psi. after being choked down from around 2,000 psi. It then passes through two high-pressure separators, and the gas enters the suction side of the compressors at 1,500 psi. The distillate goes to the 3,000 bbl. of storage available at the plant. The two 600-hp., 6-cylinder compressors discharge the gas at 3,500 psi. for





*Left: Over-all view of the recently installed cycling plant. Compressor building is at right, and auxiliary building to left. Below: In right foreground are the three sales separators. Two separators to left are high-pressure type which receive distillate from wells*

reinjection into the reservoir. Suction line is 4½ in. and discharge is 5 in.

A sales separator battery is also included in the plant layout. This consists of a 2,000, 1,000, and 125-psi. separator setup. Two 65-kw. generators furnish electricity for the plant. Meters are provided at each well to measure the production.

Goebel field was discovered in May 1943 and the first two wells were drilled in that year. Wells 3, 4, and 5 were drilled in 1944. Western Natural bought the properties from Henderson Coquat of Three Rivers, Tex., on July 1, 1947. Up until that time the field had been producing only a small amount of gas for local consumption because of high gas-oil ratios. The No. 5 well, which was on the water-oil contact, had been shut in. This well is now being used by Western Natural as an input well. Well No. 4 was dry—drilled on the other side of the fault.

The three-well field consists of 1,979.72 acres. Reservoir characteristics include the following: average depth to top of sand, 7,020 ft.; average pay thickness, 26 ft.; average porosity, 27 per cent; and connate water, 33 per cent. Two possible producing sands, other than the Luling which is being recycled at present, are available. These are the upper Slick at around 6,870 ft., and the lower Slick at 6,950 ft. Wells are producing about 30 bbl. of water daily which is being disposed of in a waste pit. The average liquid hydrocarbon content of the gas after separation is 1.38 gal. per M.c.f.

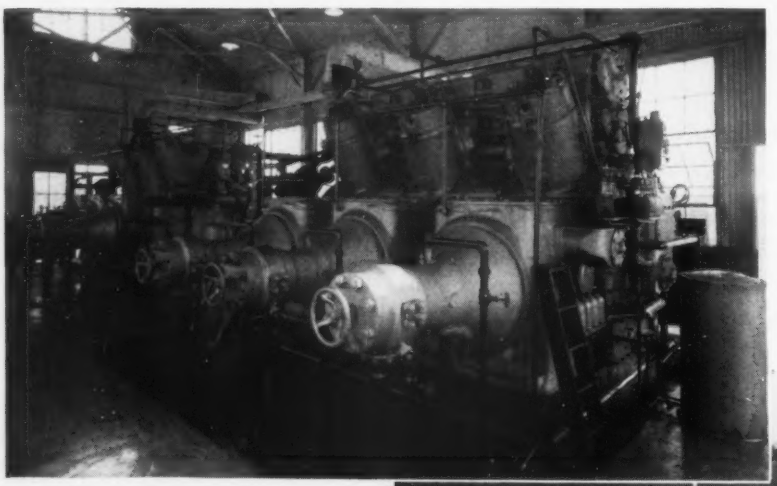
It is a little early to determine the precise results of the cycling operations which started last February. However, the plant is "maintaining reservoir pressure satisfactorily." Western Natural started out with extremely high injection pressures—as much as 4,000 psi. This was gradually increased to 4,250 psi. In March, however, the injection well was acidized and the pressure immediately went down to about what it is at the present time. In April, wells 1 and 2 were cut back and well 3 was increased to conform with Railroad Commission allowable orders. In October, well 3 was cut back to reduce water production, which was increasing.

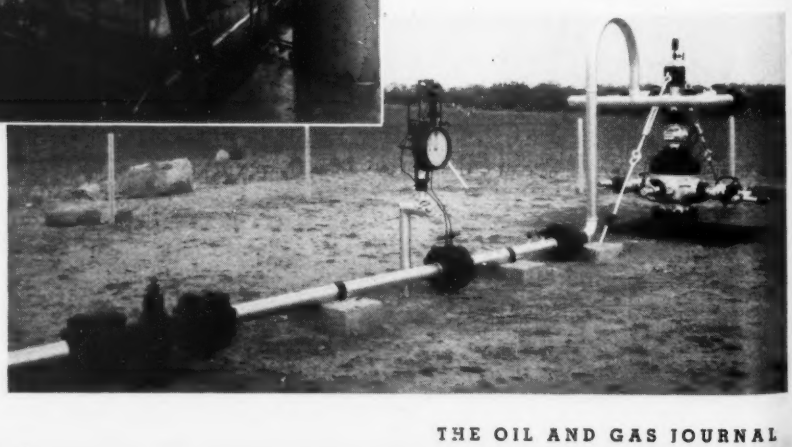
Bottom-hole-pressure history of the operation to date is as follows:

**BOTTOM-HOLE PRESSURE AT —6,800 FT. DATUM**

| Date— | Well No. 1 | Well No. 2 | Well No. 3 | Well No. 5 |
|---|---|---|---|---|
| Feb. 7 | 3,081 | 3,091 | 3,082 | 3,117 |
| May 7 | 3,087 | 3,084 | 3,070 | 3,136 |
| Aug. 6 | 3,099 | 3,097 | 3,067 | 3,139 |
| Nov. 6 | 3,094 | 3,072 | 3,077 | 3,144 |

Superintendent of the Goebel plant is Joe Yarbro and Harry Russell as division superintendent for Western Natural with offices at Edinburg. Refinery Maintenance Co. of Compton, Calif., was the contractor for the erection of the plant.

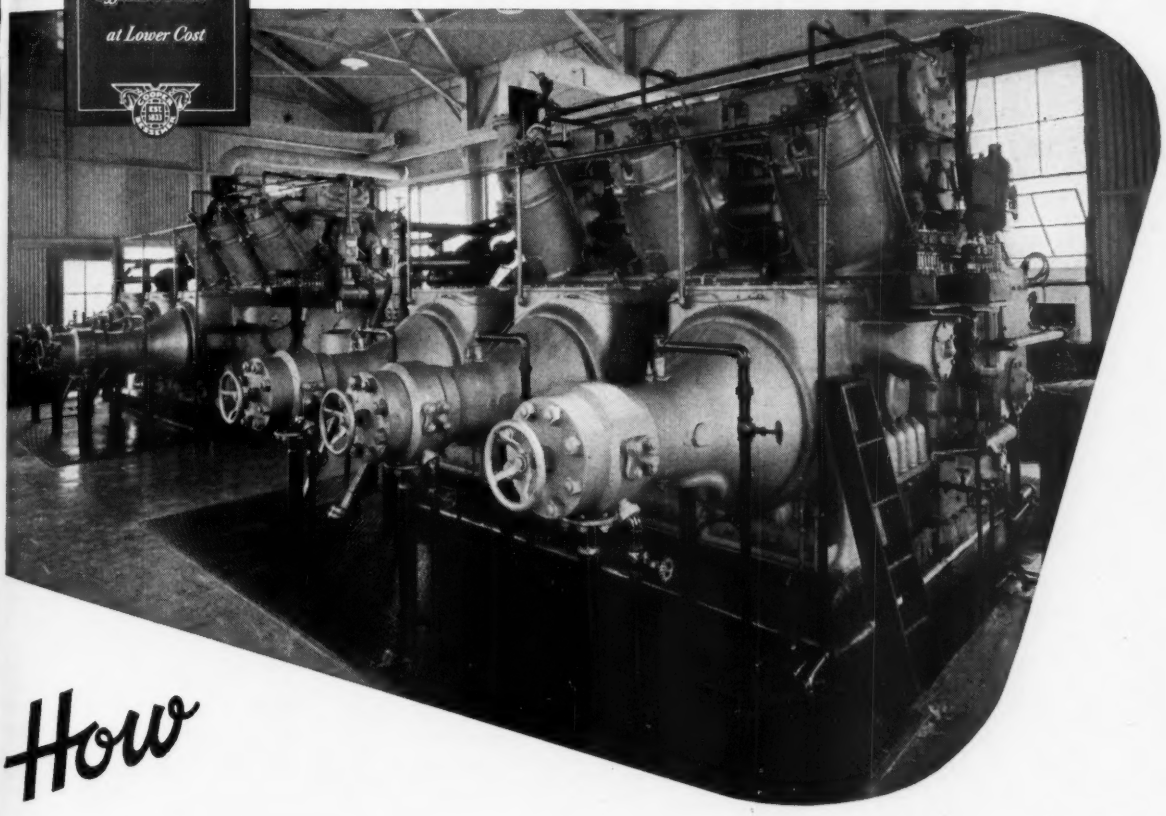




*Above: These two 600-hp. compressors can handle 30,000 M.c.f. of gas daily at 3,500 psi. Right: This injection well is handling 15,000 M.c.f. of gas daily for injection into the Luling sand at 7,000 ft. Injection pressures are 3,200 psi.*

*Another Example of Efficient Power at Lower Cost*

These two 6-cylinder GMV's provide 1200 compressor horse-power at Western Natural Gas Company's 3-well, Goebel Field cycling plant. Currently compressing 15,000 Mcf of gas daily, from 1,500 to 3,500 psi, units have capacity for 30,000 Mcf to meet anticipated increases in volume of gas to be handled.



# How GMV compactness and durability pays off

## *for Western Natural*

The two Cooper-Bessemer GMV compressors you see here have outlived the cycling requirements in one field . . . and are now doing an efficient job in a new location. Installed eight years ago at Edinburg, Texas, they were recently transferred by Western Natural Gas Company to handle the compressor requirements at their new Goebel cycling plant in Live Oak County, Texas.

This "case history" is significant. First, it testifies to the long, efficient life of these modern Cooper-Bessemer V-angles — units that obviously are ready for many more years of trouble-free, low-cost operation. Secondly, it emphasizes the advantage of GMV compactness — compressors that are installed, housed, operated and maintained at exceptionally low cost.

Cooper-Bessemer V-angles, long-lived, unusually compact, are built in three types for all compressor needs from 200 to 2400 bhp. Let Cooper-Bessemer prove to you how these modern units can add to your profits.

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*3—Summarization Statement on:*

# GAS-DRIVE PERFORMANCE

**by Dr. Morris Muskat***

A GAS-DRIVE reservoir is one which makes use of the energy of the dissolved or free-gas phase as the primary agent for oil expulsion and production. In the case of the solution-gas drive, it is the solution gas which provides this energy. The action of the solution gas may be visualized as involving two different but closely related aspects. One is simply the direct volumetric displacement. This phase predominates during the early production history when gas is first being evolved from solution, and whereby of necessity there must be an equivalent volumetric expulsion of oil simply to make room for the volume occupied by the free gas which has escaped from solution and is still distributed within the reservoir pore space.

If the formation has a nonvanishing equilibrium gas saturation, the displacement efficiency of the evolved gas will be 100 per cent during the buildup of the equilibrium saturation. When the gas becomes mobile, it begins to exert a driving or drag action on the oil as well as a direct displacement. The pressure gradients acting on the gas phase and causing it to flow to the well bore also are applied in the oil phase and cause it to flow and be produced at the same time. The volumetric displacement efficiency, however, of this latter effect continually decreases as the gas-oil ratio rises, and may become even less than 1 per cent during the later stages of depletion.

### Description of Principle

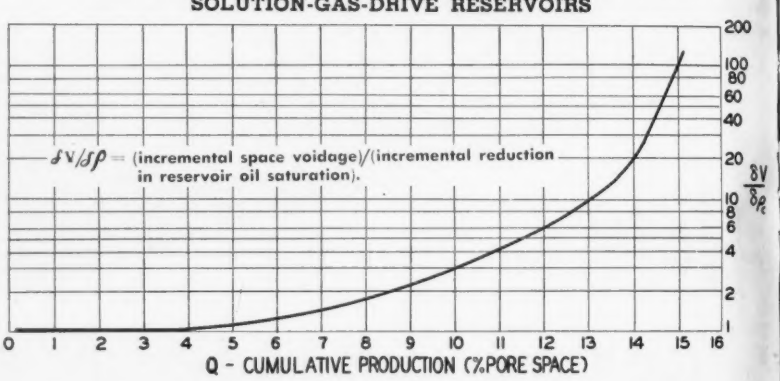
In principle, the performance of gas-drive reservoirs can be described by the basic equations for multiphase fluid flow using the generalized permeability concept and Darcy's law. These equations, however, are intractable except for special cases of steady-state flow and systems of simple geometry. For treating transient or depletion problems, one must introduce approximations and simplifications. For this purpose it suffices to neglect the pressure gradients in the system and to assume that each differential element behaves as every other, as if it were isolated and without intercommunication with the remainder of the system.

Using this type of representation for the actual reservoir it is possible to construct a differential equation relating the oil saturation at any time to the local reservoir pressure at that time. While this approximation ignores the effects of pressure gradients and distances of fluid travel, it does take into account the basic characteristics of multiphase fluid flow by interrelating the instantantous gas-oil ratio, associated with the simultaneous gas and oil production, with the permeability-saturation characteristics of the producing formation. This differential equation is of the first order and can be readily integrated numerically, or it can be replaced by an equivalent trial-and-error procedure.

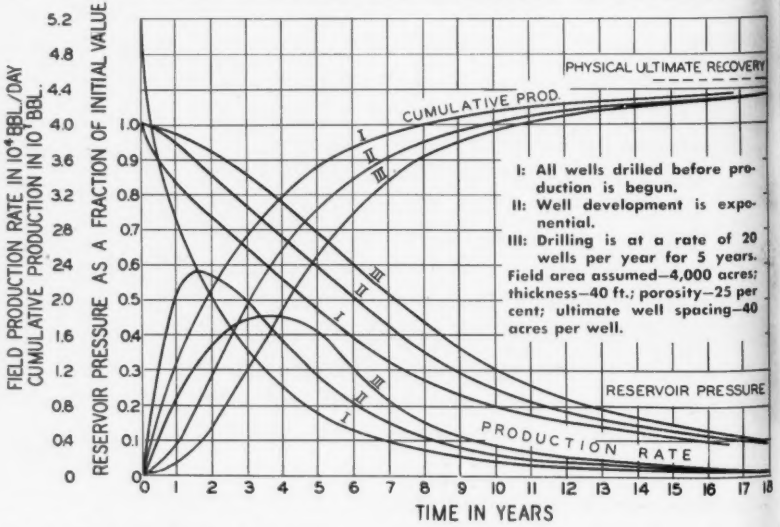
The typical solutions of this equation for solution-gas-drive performance have several characteristic features. If the producing rock is assumed to have a nonvanishing equilibrium gas saturation, the transient buildup of this saturation is reflected by a decline in gas-oil ratio corresponding to the continuous instantaneous solution value until the free gas saturation rises to its equilibrium value.

After the latter state is reached, at which the gas-oil ratio is a minimum, the gas-oil ratio begins an increasingly rapid rise, which ultimately tapers off, reaches a maximum, and then declines sharply again as complete

**CALCULATED DISPLACEMENT EFFICIENCY IN IDEAL SOLUTION-GAS-DRIVE RESERVOIRS**




**THEORETICAL PRODUCTION-DECLINE CURVES FOR A SOLUTION-GAS DRIVE FIELD UNDER DIFFERENT METHODS OF DEVELOPMENT**


FIELD PRODUCTION RATE IN 10⁴ BBL./DAY
CUMULATIVE PRODUCTION IN 10⁷ BBL.
RESERVOIR PRESSURE AS A FRACTION OF INITIAL VALUE
5.2 4.8 4.4 4.0 3.6 3.2 2.8 2.4 2.0 1.6 1.2 0.8 0.4 0
1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0
PHYSICAL ULTIMATE RECOVERY
CUMULATIVE PROD.
I
II
III
I: All wells drilled before production is begun.
II: Well development is exponential.
III: Drilling is at a rate of 20 wells per year for 5 years.
Field area assumed—4,000 acres; thickness—40 ft.; porosity—25 per cent; ultimate well spacing—40 acres per well.
RESERVOIR PRESSURE
PRODUCTION RATE
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
TIME IN YEARS

**(With this series of articles on reservoir engineering, Dr. Muskat presents a number of important relationships in graphic form. These specific diagrams have not previously appeared in print.)**

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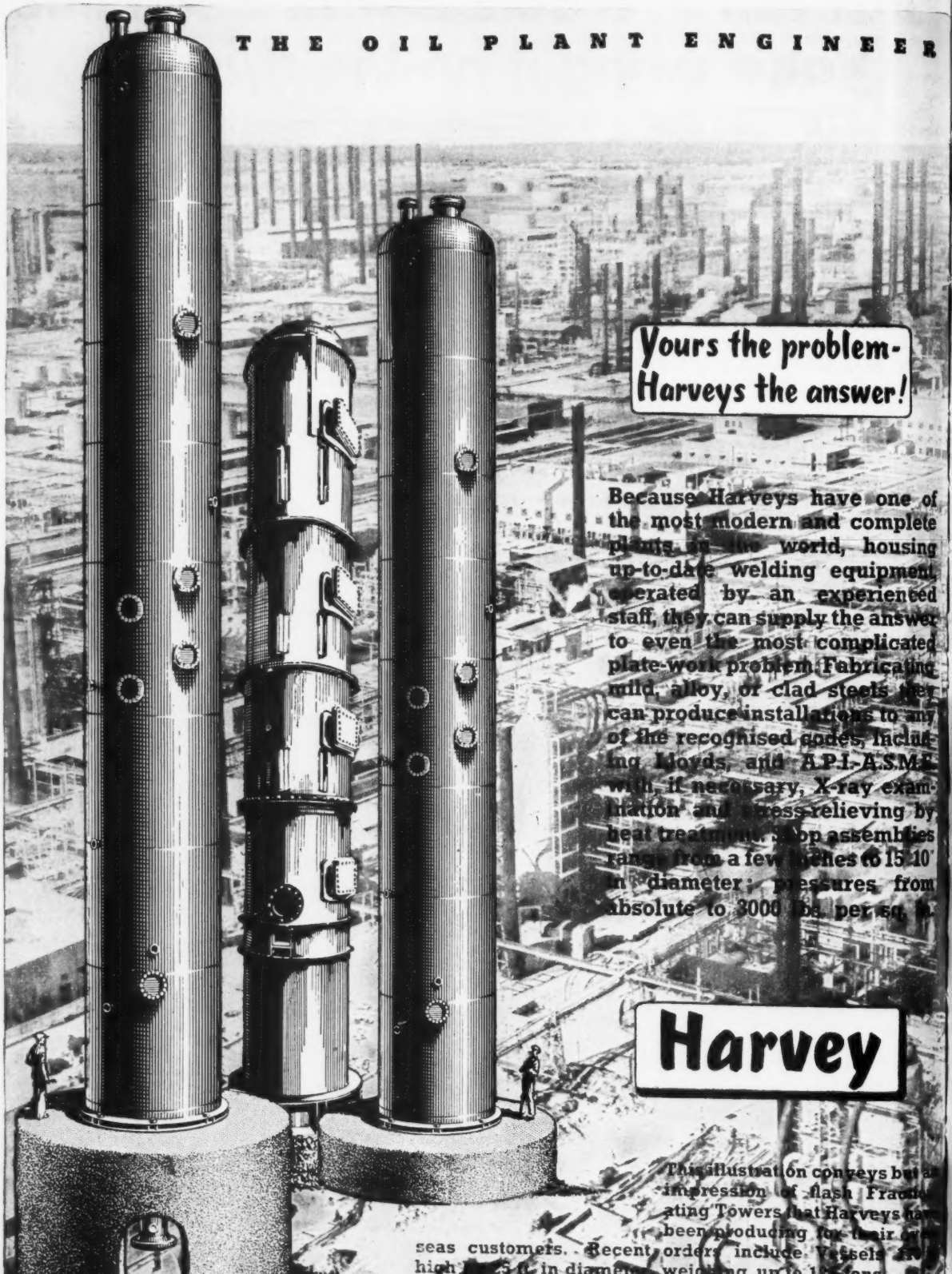
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or economic depletion is approached. The maximum value of the gas-oil ratio may exceed the original solution value by a factor of 10 or greater depending primarily on the reservoir-oil viscosity.

The pressure declines continuously at rates reflecting the current value of the gas-oil ratio. The productivity index of the wells will also decline continuously by factors of the order of 10, due to the combined effect of increasing viscosity of the reservoir oil and decreasing effective permeability of the oil during the depletion operations.

By systematic comparison calculations of the performance and recoveries predicted by the differential equation as a function of the significant fluid parameters it is possible to determine their individual effects. Thus, it has been found that the ultimate recoveries decrease continuously with increasing reservoir viscosity, and will fall by at least two fold on an increase of viscosity by a factor of about 16, if the other reservoir fluid properties are kept the same. The effect of the gas solubility alone is that of increasing recovery with increasing gas content.

Doubling the gas content of a moderate-gravity crude, assuming the shrinkage and viscosity remains the same, will theoretically increase the recovery by about 20 per cent. On the other hand, the associated change of shrinkage which will actually occur in practice will usually more than counterbalance the effect of the gas solubility alone, so that except for the influence of the gas on the reservoir viscosity the oil shrinkage will generally be the predominating factor.

For actual crudes in which the viscosity and shrinkage vary simultaneously with the solubility, and where all three properties may be roughly correlated with the crude gravity, it is found that for a given initial saturation pressure the ultimate solution-gas-drive recovery will increase with increasing A.P.I. gravity to a maximum at about 40° A.P.I. gravity, and will then decline somewhat for still higher gravities, due largely to the controlling effects of the oil shrinkage.

It is difficult to make quantitative comparisons of the theoretical solution-gas-drive behavior with field observations. It is rather seldom now that oil reservoirs are so produced throughout their lives as to be controlled entirely by the solution-gas-drive mechanism. In the early development of the industry, when wide-open production favored the operation of the solution-gas-drive mechanism, sufficient data were rarely accumulated to provide the basis for significant tests of theoretical predictions.

Aside from the inherent interest in correlating field observations with theoretical predictions, it is of value to analyze such solution-gas-drive data as are available so as to derive from them the effective permeability-saturation relationships controlling the actual performance. Studies of this type have shown a gross parallelism with the laboratory-determined relative-permeability data. At the same time they give indications of the degree of nonuniformity in the reservoir rock and in the fluid distributions developed during depletion, which reflect in an instructive manner the deviations of actual reservoirs and their behavior from the idealized conditions assumed in theoretical calculations

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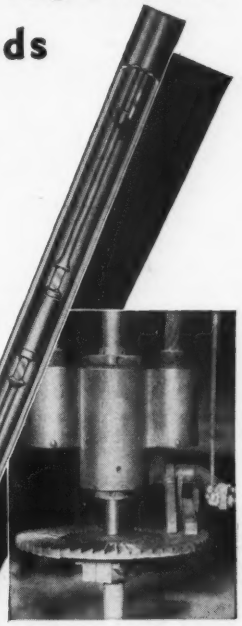

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# Can Geophysical Reflections be correlated with Geological Horizons?

**by E. J. Handley***

THE subject of this article is one of the most interesting, if not the most controversial, in the entire realm of exploration geophysics. There has been so much discussion on this subject in the past by so many geophysicists that practically every phase of the topic has been the subject of conversation at one time or another. For that reason there is little hope of our adding anything new or startling but we may be able to contribute something by trying to analyze the problem from a logical standpoint so that at least we will have some guide posts to help us keep our thinking clear.

Most arguments are caused by either lack of definition or insufficient information. Before one attempts to solve a problem, one should first set down a clear set of definitions. This type of thinking is rather common with most scientists; and in fact, the orderly process of sifting facts from opinions has been named the "scientific method." We might introduce our reasoning by defining facts as "those data which can be observed as a result of some natural phenomenon." The observer can be oneself, but it is necessary that inherently within the observation it is possible to teach someone else to obtain the same data. Opinions, on the other hand, are beliefs held by an individual.

### Definition of Geophysical Reflection

A geophysical reflection may be defined as a seismic event indicated on the records which is evidence of a burst of energy being received at the surface and whose description in terms of "time" and "distance" conform to the mathematical laws governing elastic wave motion. A geological horizon may be defined as some consistent boundary within the geological section which can be recognized and which separates the rocks into layers because of difference in sedimentation, lithology, or paleontology. Variations in density or elasticity of the rocks need not be associated with such a boundary.

All a geophysicist does in the final analysis is to make observations or measurements of variations in certain geophysical properties of the earth. The variations in these properties of matter are governed by exact physical laws. It is necessary, however, that the geophysicist **interpret** these factual observations and measurements and endeavor to translate them into more or less equivalent geological terms. This process can **not** be governed by physical laws and in many instances may become more of an art than a science. For that reason, opinions arise concerning geophysical interpretation. The question as to whether or not geophysical reflections can be correlated with geological horizons should be resolved on a basis of facts alone.

*Vice president, Century Geophysical Corp.

### Central Oklahoma Example

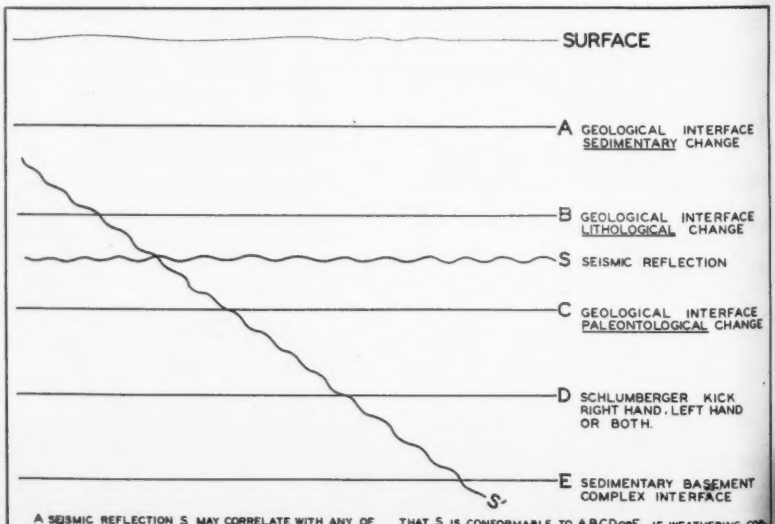
In an area in central Oklahoma, for example, a seismograph survey was conducted in which a Pennsylvanian and a pre-Pennsylvanian reflection were mapped and tentatively identified as Dewey lime and Viola lime; the velocity survey indicated that the Viola trough would correlate precisely with the top of the Viola limestone but the shallower reflection, which was correlative on character, did not conform to either the top or bottom of the Avant-Dewey section.

In certain areas in North Texas, and also in the San Joaquin basin of California, excellent reflections with consistent character which could be correlated over rather large areas were found **not** to correlate with any known geological markers, but did correlate with characteristic Schlumberger resistivity kicks which occurred in the body of rather thick shale sections.

In portions of Mississippi, North Louisiana, and East Texas, shallow reflections will correlate with the geological horizons—for example, the various so-called "chaulk" reflections —whereas, velocity surveys indicate that deeper reflections are not similarly correlative.

Such example could be cited almost without limit. Thus it is an observation or a statement of facts, and not an opinion, to say that in some areas some reflections are correlative geologically, and in others they are not.

It is desirable that velocity surveys be run on all dry holes that are available, and the seismic surveys should be tied to these velocity tests. The reflection times can thus be calibrated precisely in terms of geologic interfaces. It is quite common nowadays for geophysicists to place the reflection record along the "time" coordinate on the velocity survey graph, with the well log along the "depth" coordinate. The reflection times can thus be correlated by in-


SURFACE
A GEOLOGICAL INTERFACE SEDIMENTARY CHANGE
B GEOLOGICAL INTERFACE LITHOLOGICAL CHANGE
S SEISMIC REFLECTION
C GEOLOGICAL INTERFACE PALEONTOLOGICAL CHANGE
D SCHLUMBERGER KICK RIGHT HAND, LEFT HAND OR BOTH.
E SEDIMENTARY BASEMENT COMPLEX INTERFACE
S'
A SEISMIC REFLECTION S MAY CORRELATE WITH ANY OF THE HORIZONS A,B,C,D OR E, OR IT MAY NOT PRECISELY COINCIDE WITH ANY OF THEM. THE IMPORTANT THING IS THAT S IS CONFORMABLE TO A,B,C,D OR E. IF WEATHERING CORRECTIONS AND VELOCITY CHANGES ARE PROPERLY ACCOUNTED FOR, A SEISMIC EVENT SUCH AS S' SELDOM, IF EVER, WILL OCCUR

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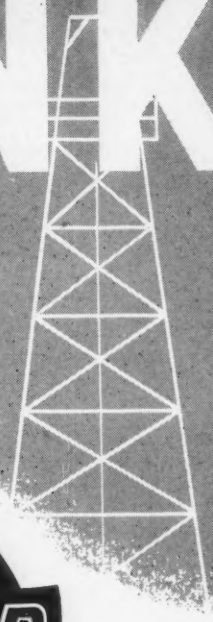

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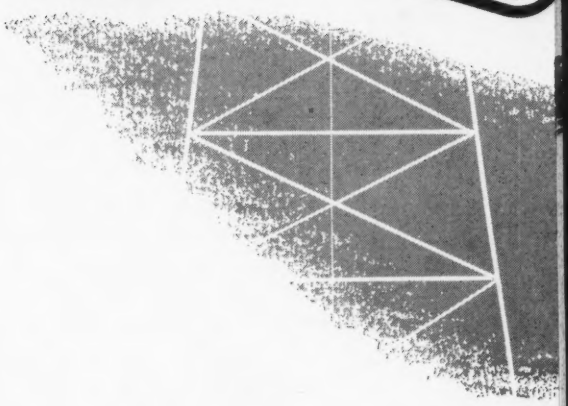

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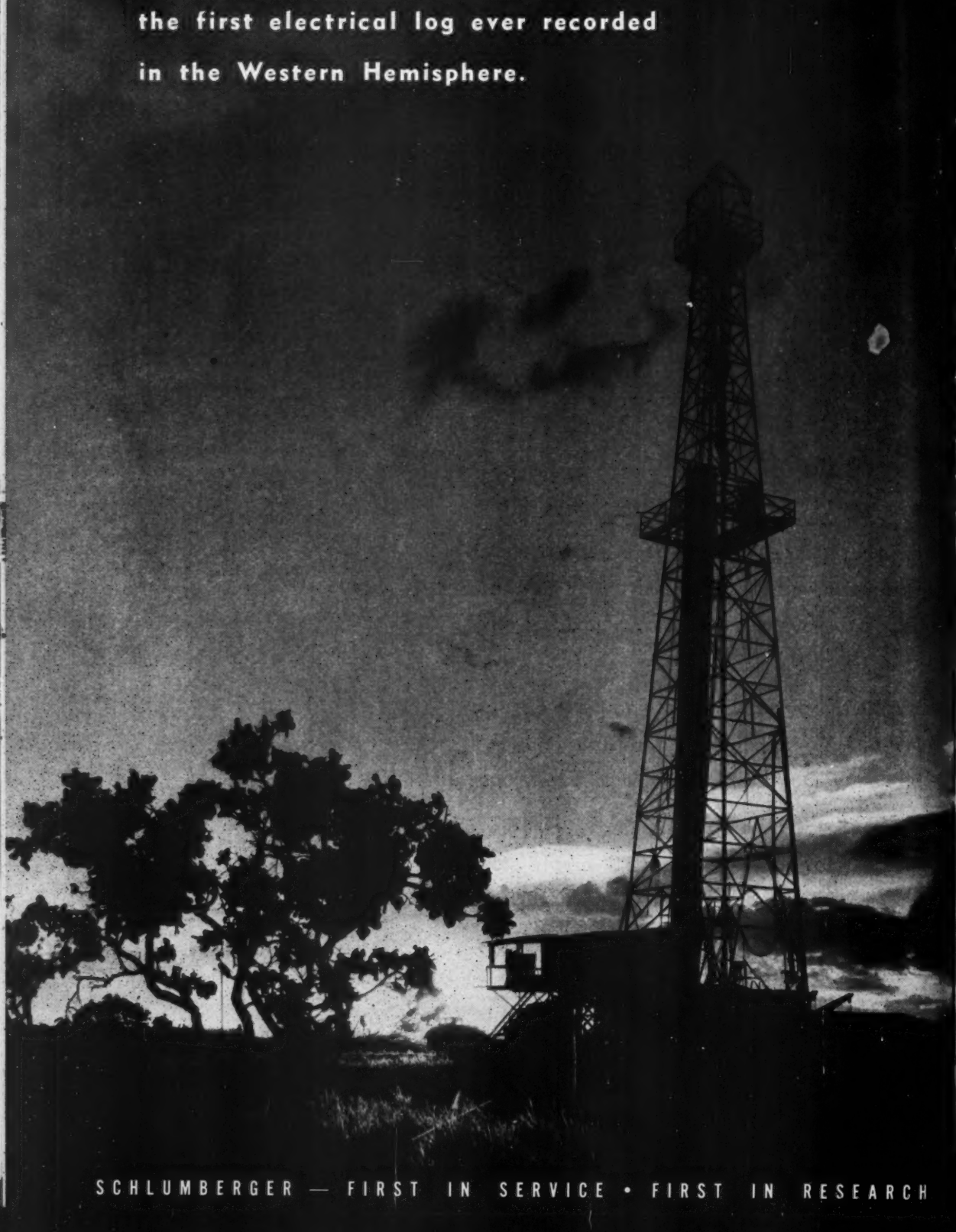

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spection with the geological log. In some instances, it is similarly beneficial to plot the Schlumberger log along the depth coordinate so as to calibrate the reflection times with the Schlumberger kicks.

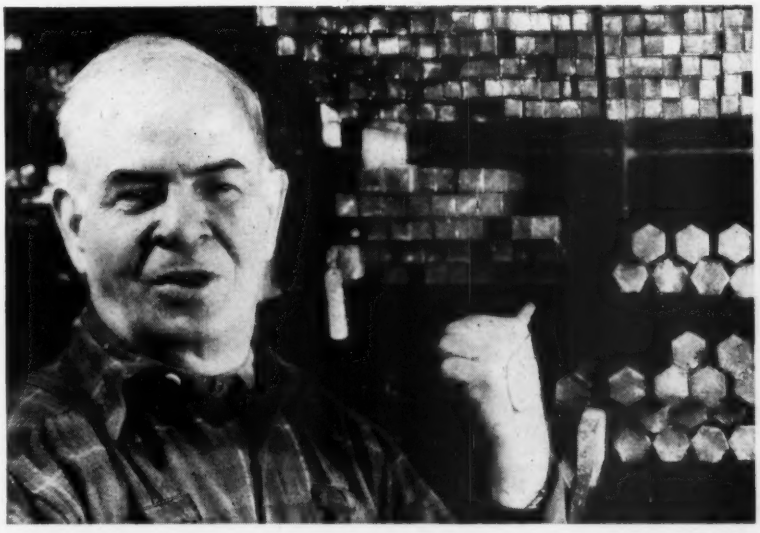
In many areas one will find that the seismic reflections will correlate more closely with the self-potential curve, or left-hand side, of a Schlumberger survey, than with the resistivity curve, or right-hand side. From considerations of basic principles describing the properties of matter, there are good reasons why one should expect this. The self-potential curve is more indicative of the nature of the material insofar as porosity, and therefore, density is concerned. Neglecting the effects indicated by the bulk modulus of elasticity, one would therefore expect density changes to indicate velocity changes, and a good reflection should be associated with some velocity interface. If in a new area one can find a good left-hand Schlumberger kick that can be readily correlated among several wells, one can reasonably expect to find a correlative seismic reflection extending over that area which will be conformable to the geological horizon associated with the kick.

Velocity surveys made from a statistical analysis of Delta t's or from long, reserved velocity profiles are useful largely to get a rough correlation of the portion of the geological section whence a reflection comes. But the velocity is not sufficiently accurate to calibrate the reflection with a given horizon, and a simple mathematical calculation will show that depth calculations made from such velocity information are not diagnostic. Similarly it is a rather dangerous practice to endeavor to identify a reflection by **assuming** a reasonable velocity and endeavoring to tie a good correlative reflection to a known depth from the log at some dry hole.

For example, an excellent reflection may occur at one second in an area with a velocity survey a few miles away. Further, for example, assume the survey indicated an average velocity to the Viola of 10,000 ft. per second. Assume the reflection time of 1 second to be tied to a dry hole, where the depth to the Viola is known to be 5,000 ft. Since the reflection time is 1 second and the log of the dry hole shows the depth to the Viola to be 5,000 ft., the resulting velocity will naturaly be 10,000 ft. per second. Yet **this** reflection could very easily be from some other bed perhaps 200 to 400 ft. shallower or deeper with a corresponding change in average velocity. This type of mistake has been made in the past and will no doubt continue to be made in the future so long as geophysicists are more or less forced to stretch their data by conjectures in order to translate their times into depths. One may observe here in passing that it is a fact, not an opinion, that it is often better in the absence of good velocity information to leave the map in time rather than feet because it precludes the entrance of another variable into the computations.

A few years ago, because of certain opinions that were held by various geophysicists, two schools of thought appeared to develop. One school consisted of the "character correlation" adherents, and the other school consisted of the "continuous" believers. Each group was right, but each pursued their thoughts too far along the lines of opinions rather than facts, and much spot correlation work had to be reshot, either because the point-to-point correlations were erroneous, or because the bed did not represent the geological marker it purported to represent; and similarly the continuous shooting extremists missed faults or forced the data past bad spots without trusting character, and became hopelessly confused in miscorrelated and mistied loops.

It appears that we can state, therefore, that the facts indicate that in some areas reflections are geologically correlative and in some areas they are not. Seismic surveys should be tied to velocity surveys whenever it is possible to do so. It is quite evident that we do not know enough about what a reflection is or what causes it, and that research work should be done along this line.

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# Application of

# Compressibility Factors

## in the estimation of gas reserves

*by E. B. Elfrink,* C. R. Sandberg,* and T. A. Pollard**

COMPRESSIBILITY factors† of natural-gas and condensate systems are used extensively in the decline curve, the volumetric, and the material-balance methods of gas-reserves estimation. The misuse or nonuse of compressibility factors in any of these methods results in sizable errors of estimation. No attempt will be made here to cover the use of compressibility factors in all methods of reserves estimation. Other authors[1] have covered in some measure the use of compressibility factors in the decline-curve method. However, this discussion will deal only with the volumetric method, the formula for which is:

$$Q = \frac{43{,}560 \times \Phi \times (1 - S_w) \times 379.3 \times Z_1 \times P \times E.R.}{Z_2 RT}$$

**Nomenclature**

E.R. = equivalent ratio =

$$\left[\frac{\text{cu. ft. gas}}{\text{cu. ft. gas} + \left(\frac{\text{bbl. oil} \times 5.615 \times 379.3}{\text{sp. vol. of oil} \times \text{mol. wt. of oil}}\right)}\right]$$

P = reservoir pressure, psia.
$P^pR$ = pseudo-reduced pressure
$P^TR$ = pseudo-reduced temperature
Q = cu. ft. of gas in place per acre-ft. at 60° F. and 14.7 psia.
R = 10.73
$S_w$ = interstitial water content of reservoir, expressed as a decimal fraction
T = reservoir temp., °R. (459.6 + °F.)
$Z_1$ = compressibility factor of produced gas at 60° F. and 14.7 psia. (can be determined from Fig. 1 by using left ordinate)
$Z_2$ = "compressibility" factor of entire system at reservoir conditions
Φ = porosity, expressed as a decimal fraction
379.3 = volume in cubic feet occupied by 1 lb. mol of gas at 60° F. and 14.7 psia.
43,560 = cu. ft. per acre-ft.

Quite often in the use of the volumetric equation some of the terms and factors are not used or are overlooked. It has been the practice in some cases to use the compressibility of the produced gas at surface conditions and to neglect any correction for the liquid present. In the above equation, the equivalent ratio (E.R.) makes this correction. The gas in place can be overestimated by not using the equivalent ratio. This overestimation can be as great as 15 per cent for systems of low gas-oil ratio (4,000-5,000 cu. ft. per barrel).

The errors resulting from the complete omission of the compressibility factor from the volumetric calculation can be quite large. The per cent underestimation of the gas in place becomes greater as the gas-oil ratio of the system is decreased, and can be as large as 50 per cent in a 6,000-gas-oil-ratio system existing as two phases at 3,000 ft. Errors as large as 20 per cent may exist for single-phase systems. Nevertheless, accurate results can be obtained for these systems by using Fig. 1, if the total system composition is known.

The use of compressibility factors in the volumetric equation does not completely eliminate all sources of error. The Katz compressibility fac-

**TABLE 2—EXAMPLE OF GAS-IN-PLACE ESTIMATION USING FIG. 1 AND THE KATZ CORRELATION**

**Given:**
Reservoir pressure, P = 2,500 psia.
Reservoir temp., T = 150° F.
Porosity, Φ = 0.30
Interstitial water content, $S_w$ = 0.23
$P^pR$ (total product at reservoir cond.) = 3.89
$P^TR$ (total product at reservoir cond.) = 1.25
$P^pR$ (produced gas at std. cond.) = 0.02179
$P^TR$ (produced gas at std. cond.) = 1.259
Produced gas-oil ratio = 6,241 cu. ft./bbl.
Trap gas/day = 2,754,000 cu. ft.
Vent gas/day = 223,116 cu. ft.
Tank oil/day = 477 bbl.
Specific vol. of tank oil = 0.021314 cu. ft./bbl.
Molecular wt. of tank oil = 120.06

**A.—Using Fig. 1**

$$Q = \frac{43{,}560 \times \Phi \times (1 - S_w) \times 379.3 \times Z_1 \times P \times E.R.}{Z_2 RT}$$

$Z_1$ from Fig. 1 = 0.996

$Z_2$ from Fig. 1 = 0.720

$$E.R. = \frac{2{,}977{,}116}{2{,}977{,}116 + \left(\frac{477 \times 5.615 \times 379.3}{0.021314 \times 120.06}\right)} = 0.8823$$

$$\therefore Q = \frac{43{,}560 \times 0.30 \times 0.77 \times 379.3 \times 0.996 \times 2{,}500 \times 0.9923}{0.720 \times 10.73 \times 609.6}$$

= 1,781,300 cu. ft. gas/acre-ft.

**B.—Katz chart**

$Z_2$ from Katz chart = 0.623

$$\therefore Q = \frac{43{,}560 \times 0.30 \times 0.77 \times 379.3 \times 0.996 \times 2{,}500 \times 0.8823}{0.623 \times 10.73 \times 609.6}$$

= 2,057,475 cu. ft. gas/acre-ft.

Per cent overestimation

$$= \frac{2{,}057{,}475 - 1{,}781{,}300}{1{,}781{,}300} \times 100 = 15.6$$

**TABLE 1—COMPARISON OF CALCULATED AND MEASURED SPECIFIC VOLUMES FOR A CONDENSATE MIXTURE**

| Press., psia. | $P^pR$ | Z from Katz | Z from Fig. 1 | Per cent diff. in compress. | Sp. vol., cu.ft./lb. (Computed, Katz) | Sp. vol., cu.ft./lb. (Computed, Fig. 1) | Sp. vol., cu.ft./lb. (measured) | Phase |
|---|---|---|---|---|---|---|---|---|
| 5,000 | 7.794 | 0.962 | 0.962 | 0.0 | 0.03760 | 0.03760 | 0.03748 | Single-phase |
| 4,500 | 7.015 | 0.892 | 0.892 | 0.0 | 0.03874 | 0.03874 | 0.03885 | Single-phase |
| 3,500 | 5.456 | 0.0750 | 0.790 | 5.3 | 0.04188 | 0.04411 | 0.04395 | Two-phase |
| 3,000 | 4.676 | 0.686 | 0.747 | 8.9 | 0.04469 | 0.04866 | 0.04887 | Two-phase |
| 2,500 | 3.896 | 0.635 | 0.726 | 14.3 | 0.04964 | 0.05675 | 0.05696 | Two-phase |
| 2,000 | 0.118 | 0.599 | 0.724 | 20.9 | 0.05853 | 0.07074 | 0.07074 | Two-phase |

T = 160° F.; $P^TR$ = 1.273; Gas-oil ratio = 6,241 cu.ft./bbl.

*Magnolia Petroleum Co., Field Research Laboratories, Dallas. This article is a portion of paper presented at the annual A.I.M.E. meeting, February 13-17, San Francisco.

†In this paper the term "compressibility" refers to the term "Z" in the equation PV = ZNRT, for either single or two-phase systems. The behavior of gases at high pressures has been investigated extensively in recent years and considerable data have been assembled on the compressibility characteristics of a number of gases. Notable among the investigators of high-pressure gas relationships are Kvalnes and Gaddy,[2] Kay,[3] Sage and Lacey,[4] and Brown,[5] Standing,[6] and Katz.[7] Other contributors are Smith and Watson,[8] Roland and Kaveler,[9] and Stevens and Vance.[10] The data on compressibility factors assembled by these investigators have been presented and correlated in numerous ways; particularly noteworthy is the method first presented by Kay[3] which related compressibility factor "Z" to pseudo-reduced temperature and pseudo-reduced pressure. Other investigators have used this empirical relationship successfully and numerous charts covering a large number of gases have been constructed on this basis.

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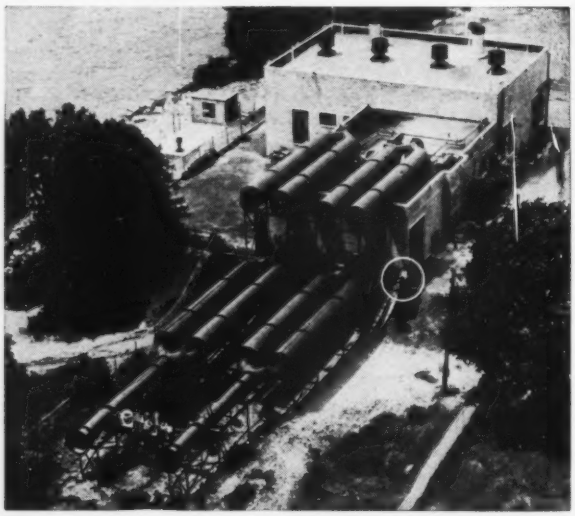

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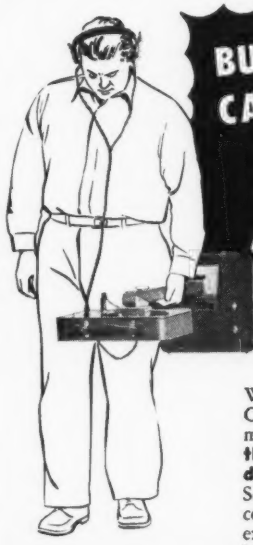

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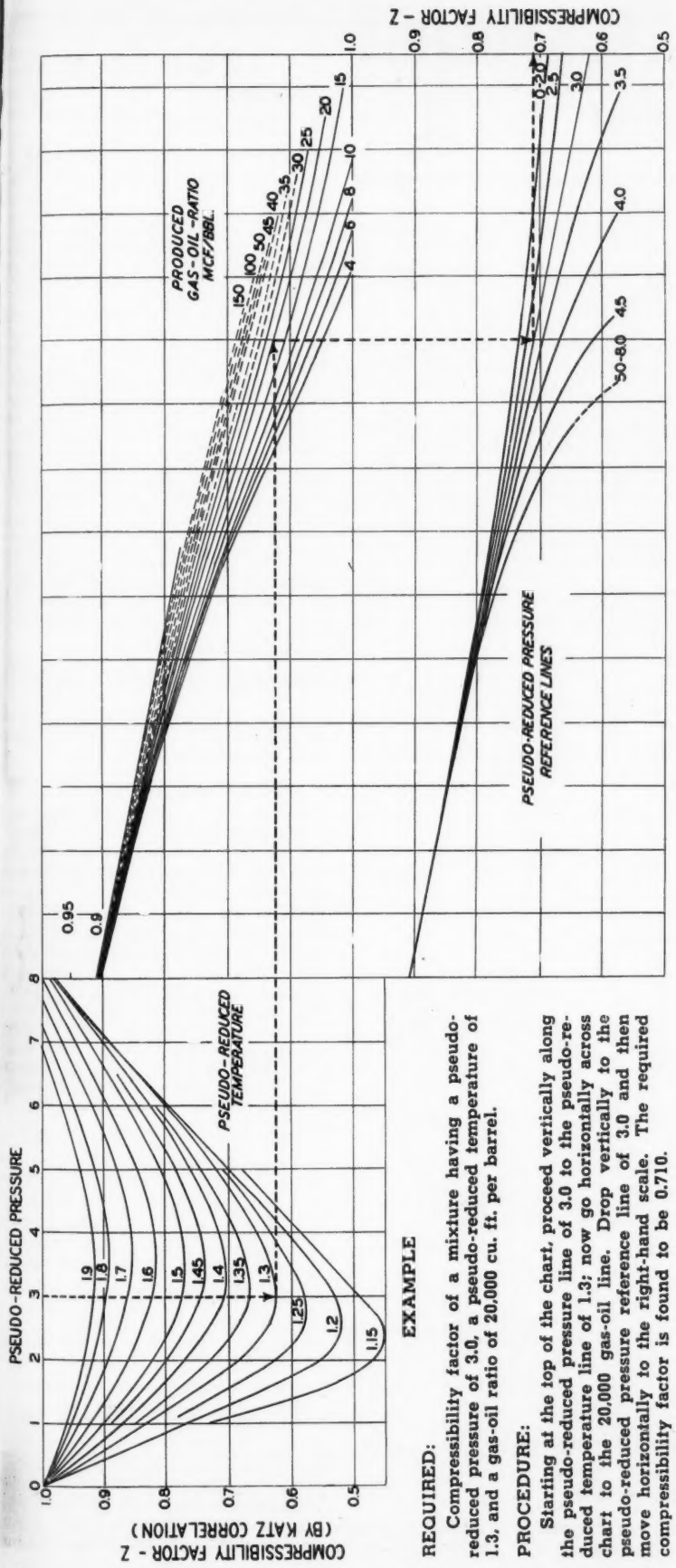


**EXAMPLE**

**REQUIRED:**

**Compressibility factor of a mixture having a pseudo-reduced pressure of 3.0, a pseudo-reduced temperature of 1.3, and a gas-oil ratio of 20,000 cu. ft. per barrel.**

**PROCEDURE:**

**Starting at the top of the chart, proceed vertically along the pseudo-reduced pressure line of 3.0 to the pseudo-reduced temperature line of 1.3; now go horizontally across chart to the 20,000 gas-oil line. Drop vertically to the pseudo-reduced pressure reference line of 3.0 and then move horizontally to the right-hand scale. The required compressibility factor is found to be 0.710.**

tors for gaseous systems cannot always be applied to systems of low gas-oil ratio where conditions are such that a liquid phase is present at the temperature and pressure considered. Overestimation of gas in place results from using gas (single-phase) compressibility factors for systems that are two-phase. Such errors would be minimized by using the chart presented in Fig. 1.

### Use of Compressibility Chart

Fig. 1 has advantages over the normal single-phase compressibility charts in that it can be used safely in both single (infinite gas-oil ratio) and two-phase regions. This chart can also be used with the Katz chart (included as part of Fig. 1) to indicate the presence of liquid in a system of known composition, at reservoir conditions. Any marked difference in compressibility factors from the two charts is a satisfactory indication of liquid being present in the system at the state point chosen. This is illustrated by examples given in Table 1. It is believed that this usage of Fig. 1 will be of considerable value in indicating whether a condensate system is at or below dew point at reservoir conditions, in the absence of complete P.V.T. data.

A sample calculation of gas in place for an actual condensate system, using Fig. 1, is presented in Table 2. Comparison of the result of this calculation with one using single-phase compressibility values shows that in the latter case a sizable overestimation of the gas in place would have resulted. Appropriate adjustments must, of course, be made in the final reserve estimates for effect of unrecoverable liquid phases left in the reservoir, for two-phase systems.

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# QUESTIONS on TECHNOLOGY

**by W. L. Nelson**
Consulting Engineer

## Effect of Pressure On Inflammability

**What is the effect of pressure on the inflammability of gaseous mixtures of carbon monoxide, methane, oxygen, carbon dioxide, nitrogen and water vapor?—R. W. H.**

The inflammability limits of mixtures was discussed on the Questions on Technology page of January 13, 1949, page 66. Additional references on the behavior of mixtures are:

1. Coward, Carpenter and Payman, The Dilution Limits of Inflammability of Gaseous Mixtures, J. Chem. Soc., Vol. 115, p. 27 (1919).
2. Jones, G. W., Inflammability of Mixed Gases, Bur. Mines, Tech. Paper 450 (1929).
3. Coward, Jones, Dunkle and Hess, The Explosibility of Methane and Natural Gas, Carnegie Inst. Tech. Min. and Met. Invest. Bull. 30 (1926).
4. Taylor, S. S., Wartime Application of Air-Gas Injection and Oil-Well Reconditioning in the Appalachian Region, Bur. Mines Reports Invest. 3777 (1944).
5. Jones and Kennedy, Inflammability of Natural Gas: Effect of Pressure Upon Limits, Bur. Mines Reports Invest. 3798, Feb. 1945.

The effect of pressure has also been studied, particularly by the U. S. Bureau of Mines. In general, the effect of pressure on the lower limit of inflammability appears to be negligible for practical work, but the upper limit of inflammability increases greatly at high pressure and is decreased slightly by subatmospheric pressure. This behavior is indicated in Table 1 which are the data of Jones and Kennedy (see Ref. 5 above) on a natural gas containing 79.6 per cent methane, 19.2 per cent ethane, and 1.2 per cent nitrogen. Below about 1 psia. no mixtures are inflammable.

**TABLE 1—EFFECT OF PRESSURE ON INFLAMMABILITY LIMITS**
**(Bur. Mines Reports Invest. 3798, 1945)**

| Pressure (psia.) | Limits of inflammability, per cent by vol. | | Range of inflammability (%) |
|---|---|---|---|
| | Lower | Upper | |
| 1* | 4.5 | †8 | 3.5 |
| 2* | 4.15 | 12.5 | 8.35 |
| 3* | 4.15 | 13.4 | 9.25 |
| 4* | 4.2 | 13.7 | 9.50 |
| 10* | 4.3 | 13.8 | 9.50 |
| 14.7 | 4.65 | 14.0 | 9.35 |
| 100 | 4.90 | 17.5 | 12.6 |
| 200 | 4.90 | 22.6 | 17.7 |
| 300 | 4.50 | 30.2 | 25.7 |
| 350 | 4.10 | 37.5 | 33.4 |

*Read from a graph. †Many scattered points.

The effect of pressure on the behavior of mixtures containing carbon monoxide, carbon dioxide, etc., is not clear from any of the references. However, the upper limit data of Table 1 are plotted in Fig. 1 as a fraction of the inflammability composition at atmospheric pressure as a guide when action must be taken. It is not recommended that Fig. 1 be used directly; the dotted line should be used or even more conservative upper limits. References to the effect of pressure on inflammability limits (as well as No. 5 above) are:

6. Coward, Cooper and Jacobs, Ignition of Some Gaseous Mixtures by Electric Discharge, J. Chem. Soc., Vol. 105, p. 1069 (1914).
7. Nuckolls, Matson and Dufour, Propagation of Flame in Gaseous Vapor-Air Mixtures at Pressures Below Atmospheric, Underwriters' Laboratories, Research Bull. 7 (1939).
8. Kirst, E., Effect of Increasing the Initial Temperature and the Initial Pressure on the Explosion Limits of Firedamp, Glückauf, Vol. 67, p. 485 (1931).
9. Payman and Wheeler, The Effect of Pressure Upon the Limits of Inflammability of Mixtures of Paraffin Hydrocarbons with Air, J. Chem. Soc., Vol. 123, p. 426 (1923).
10. Berl and Werner, The Limits of Combustibility of Inflammable Gas and Vapor-Air Mixtures at High Pressures, Ztschr Angew. Chem., Vol. 40, p. 245 (1927).
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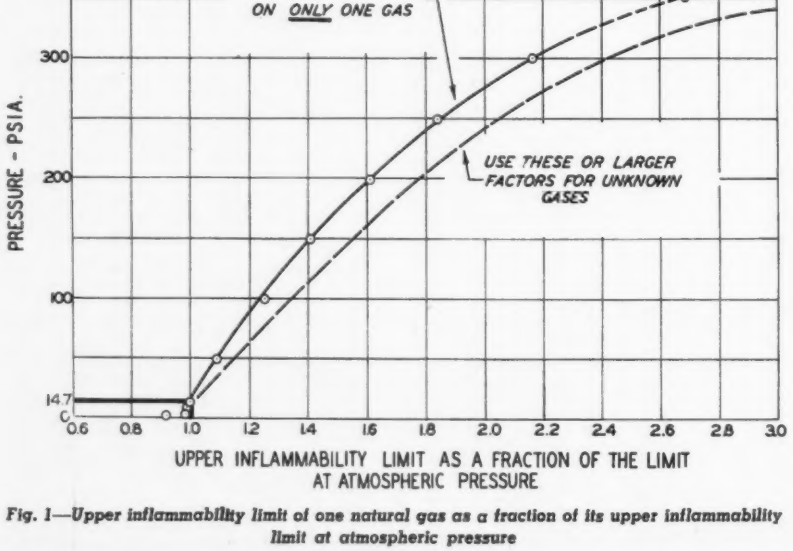



*Fig. 1—Upper inflammability limit of one natural gas as a fraction of its upper inflammability limit at atmospheric pressure*

## Conductivity of Fouling Deposits

**What is the thermal conductivity of the deposits that cause fouling of heat exchangers?—F. C. E.**

The exact physical condition of the deposits that cause heat-exchanger fouling cannot be known with accuracy and undoubtedly great variations are evident. Except in the case of dense deposits such as corrosion scales, boiler scale, cracking-coil coke, or possibly salt deposits, the thickness of the fouling deposits is extremely small. The conductivity of such dense deposits (B.t.u.-ft. per sq. ft.-hr.-°F.) are somewhat as follows:

| | |
|---|---|
| Iron sulfide | 4.1 |
| Rock salt | 3.7 |
| Cracking-coil coke | 3.0 |
| Boiler scale | 1.4 |

Most tube deposits would not be as dense as the ones just listed and hence a thermal conductivity of three or less would seem to be suitable for even the most dense fouling deposits. The relationship of thickness (l), to conductivity (k), and to resistance (R) is:

$$l = Rk$$

Thus, for fouling factors of 10 and 30 the thickness of the deposits can be:

| F.F. | Thickness, in. |
|---|---|
| 10 | $12 \times 0.03 \times 3 = 0.36$ |
| 30 | $12 \times 0.03 \times 3 = 1.08$ |

At the other extreme, and for the conditions encountered in most fouling, the deposit is of a loose or porous nature, and thus the thermal

conductivity is close to that of the fluid being handled:

| Material— | Conductivity |
|---|---|
| Oils | 0.05-0.09 |
| Asphalt | 0.1 |
| Paraffin wax | 0.133 |
| Asphalt roofing (asbestos) | 0.06 |

Thus, for such materials the thickness is negligible even for a fouling factor of 20:

$$l = 12 \times 0.02 \times 0.1 = 0.024 \text{ in.}$$

Note that the conductivities of such materials are compressed powders, charcoal, lampblack, earths, etc., were not listed. The conductivities of these materials are not usually representative of exchanger deposits because such materials derive their low conductivities primarily from the air held in them.

Between these extremes are consolidated materials such as asphaltic roads ($k = 0.42$), soil that is soaked with water ($k = 1\text{-}2$), and compressed graphite ($k = 0.1$), molded diatomaceous earth ($k = 0.16$), or diatomaceous brick ($k = 0.13\text{-}0.19$). These might be representative of certain exchanger deposits except that they contain air or water rather than oil.

## Discussion of Methods of Cleaning Heat Exchangers

*(Continued from page 65)*

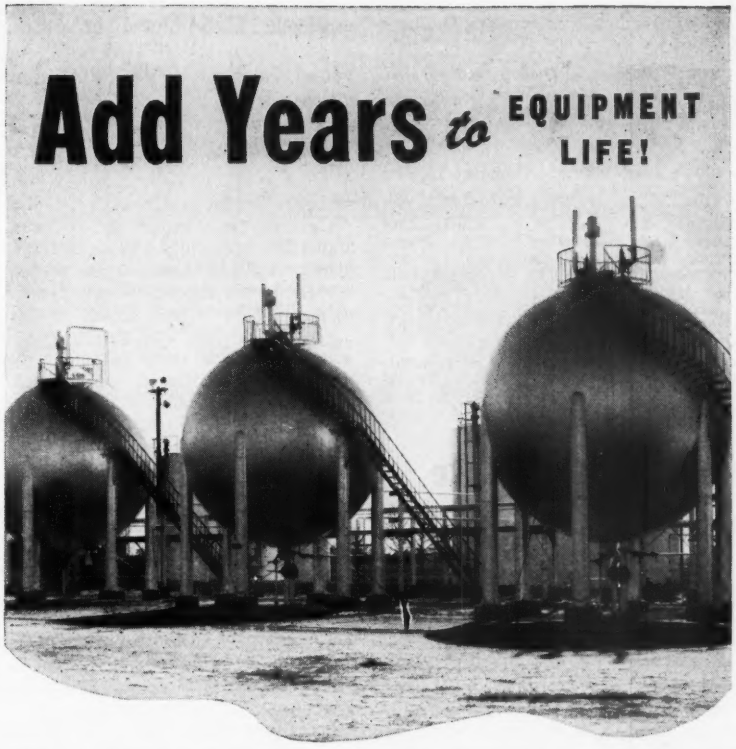
tubes become fouled this differential is often great enough to blow out the baffle gasket, permitting bypassing of the tube-side fluid and, in some cases, the baffle itself is deformed by the pressure. Grooving the tube sheet face to receive the edge of the head baffles serves both to hold the gasket and to support the baffle.

It is desirable to be able to maintain pressure on the shell side of a kettle bundle even though the head is removed, and for this reason the tube-sheet stud holes are usually tapped. In large-diameter tube sheets, having thicknesses of several inches, studs gall frequently when removal is attempted after an extended service period, and then they must be drilled out. By threading only a portion of the tube-sheet holes, or a portion of each hole, this difficulty can be minimized without losing the features of independent removal of bundle head, or bundle and head from shell, while holding pressure on the opposite side.

Alloy bolting, such as A.S.T.M.-A 193 Grade B7, with A.S.A. B1.4 1945 Class 7 thread fit is recommended for all high-pressure and/or high-temperature heat exchangers. Colloidal graphite, mixed either in a volatile oil or water, is a good lubricant for high-temperature bolting, and for certain particularly stubborn cases silicone grease is satisfactory.

**Acknowledgment**

The authors wish to express their thanks

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to those in Phillips Petroleum Co. who have contributed material and constructive criticism during the preparation of this paper, and to C. H. Groom of Dowell Incorporated, and S. F. Hegler of Oakite Products, Inc., who have contributed information.

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## Pressure Maintenance In Arkansas

*(Continued from page 60)*

psi.—they can be raised or lowered by increasing or decreasing amount of water injected. With the exception of a few edge wells, all wells are flowing and probably will continue to flow for the life of the field. Current production from 45 wells is 7,900 bbl. daily as compared with 6,200 bbl. from 40 wells in December 1943.

Under primary-recovery methods it was estimated the Smackover lime reservoir would have an ultimate yield of about 28,000,000 bbl. of oil. Under pressure maintenance it appears that an ultimate recovery estimate of 71,000,000 bbl. is conservative. Total recovery at the first of this year was 16,570,000 bbl. of which 14,677,000 bbl. were produced under pressure maintenance.

Current salt-water production is about 500 bbl. daily. This, along with about 10,000 bbl. of fresh water, is returned to the limestone reservoir through four flank injection wells. Since the project was started in 1943, about 19,800,000 bbl. of water have been injected and it is anticipated that well over 200,000,000 bbl. will be required to flush all recoverable oil from the reservoir.

### Other Arkansas Projects

In Magnolia field a cooperative water-disposal project was formed at the first of 1945. Only 360 bbl. daily of salt water were returned to the Smackover producing section for the first 9 months, but beginning in October 1945 increasing amounts of fresh water were returned. By May 1946, daily injections were averaging about 6,200 bbl., of which almost 4,000 bbl. were fresh water, through four input wells. In recent months water injections have averaged about 14,000 bbl. daily with salt water accounting for almost half of the total input.

Result of this project has been a gradual stabilization of bottom-hole pressures at about 2,800 psi., only 100 psi. less than when the project was started. Under pressure maintenance the field has yielded about 80,000 bbl. per pound pressure drop as compared with 65,000 bbl. before the project was started. Ultimate recoveries expected as a result of the program have been increased from about 100,000,000 bbl. to 146,000,000 bbl.[3]

In bistate Haynesville field, a gas-injection project for the Pettit lime zone was started late in 1944, and in March 1946 an experimental water-input program was begun.[4] Although located in both Arkansas and Louisiana, no producing difficulties have been caused as identical rules and regulations were adopted for both portions of the unitized field.

These combined projects have checked the rate of decline in reservoir pressures, and have resulted in the Pettit lime zone's estimated ultimate yield being increased to 12,000,000 bbl. Estimates of recovery by primary methods were 4,500,000 bbl.; under gas drive alone the anticipated yield was 6,500,000 bbl. These figures apply only to the one-fourth of the field that lies in Arkansas.

At Wesson field near Stephens, a unitized water-injection project was started last fall in the Hogg sand (Rodessa formation) at 3,500-ft. depth.[5] Results to date confirm predictions made prior to unitization that an ultimate oil recovery of about 24,000,000 bbl. can be expected under pressure maintenance. Under primary methods only 9,500,000 bbl. were expected to be produced, about 20 per cent of the oil originally in place. The pool being of the solution-gas-drive type, a rapid decline in pressures (from 1,280 to about 400 psi.) was registered in the 3 years since its discovery.

At Atlanta, a cooperative project was placed in operation late in 1948 to gather and return all produced salt water to the Smackover lime pay.[6] This is expected to raise the field's ultimate oil production from 15,000,000 to 20,000,000 bbl. Some 3,000 bbl. daily of salt water are being reinjected. Other data relative to Atlanta's production history, as well as fields discussed earlier, are given in an accompanying table.

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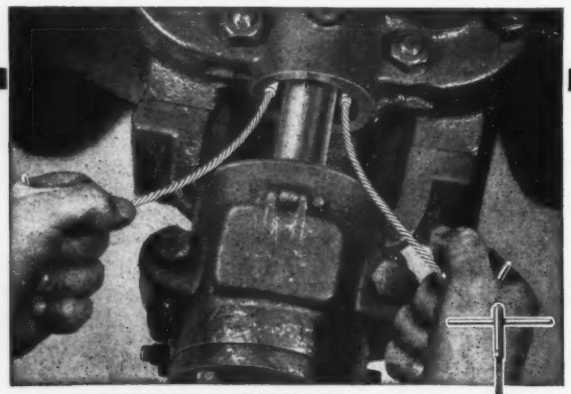

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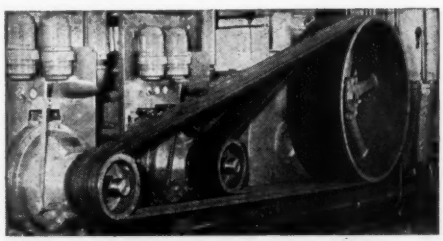

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## MAIN FEATURES

- **EFFICIENT WITH TIGHTEST EMULSIONS**
  Same efficient design as on larger units. Utilizes long travel salt water wash, indirect heating, and adequate settling space to settle emulsion.
- **ECONOMICAL TO INSTALL**
  But 4 to 6 hours required for original hook-up. No upending necessary. Connections accessible from ground level.
- **PORTABLE**
  This new unit is light and easy to move. It weighs but 2,600 lbs. complete.

Maloney-Crawford developed the M3H Horizontal Emulsion treater to fill the need for a small treater to handle small amounts of production and particularly one well leases.

The M3H has been field tested and proven of the same high efficiency as Maloney-Crawford larger Horizontal Treaters.

For further information call our nearest Service Point or write Box 659, Tulsa, Oklahoma.

## STOCKS AND SERVICE

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# DIGESTS

## A. I. Ch. E. MEETING, LOS ANGELES

**Presented here are digests of important papers on gasoline plant-refining subjects which were given at Los Angeles regional meeting, American Institute of Chemical Engineers, Biltmore Hotel, March 6-9.**

### Heat Transfer by Direct Contact Between Liquid and Vapor

R. J. O'DONNELL, R. R. BOWLES, and E. E. GULLEKSON, California Research Corp., El Segundo, Calif.

THE system studied contains three sections, each of a different contacting nature, a con-flow downward empty tower and a counterflow tower with disk and doughnut baffles in one section and perforated side-to-side baffles plus two bubble-cap decks in another section. The results show the section containing bubble caps and rain decks to be superior to that with disk and doughnut baffles.

Furthermore, it was concluded from this work that the particular arrangement under consideration has distinct advantages where rapid chilling of a vapor stream is of prime importance. The correlations seem to be firm enough to establish definitely the characteristics of the equipment within the range studied.

### Pressure Drop Through Bubble Caps

T. C. DAUPHINE, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

A METHOD for calculating vapor pressure drop through bubble caps is presented, based on correlated data from numerous experiments. Pertinent data are presented graphically, and development of final correlations is described. Conclusions concerning the best construction of bubble caps for minimum pressure drop are also derived. The correlations are based upon data from two different sets of experiments. Consequently, the relations derived can be used: first, to calculate pressure drop through any dry circular cap; second, to determine pressure drop with liquid just covering the slots. Liquid head above the top of the slots is added to the latter to give total pressure drop through a submerged cap.

### Effect of Reactor Temperature On Product Distribution And Quality in Fluid Catalytic Cracking

C. R. OLSEN and M. J. STERBA, Universal Oil Products Co., Chicago.

WITH more fluid catalytic cracking plants going into operation, the effect of reactor temperature on product distribution and product quality is becoming increasingly important to the refinery process engineer.

A series of tests was run on a pilot plant at the Research and Development Laboratories of Universal Oil Products Co. These tests were made at three temperature levels: 800°, 900°, and 950° F. with synthetic catalyst. All the tests were once-through and the conversions at each temperature level varied from approximately 45-75 volume per cent gas oil disappearance.

Plots of product distribution and quality against conversion are presented for the three temperatures. Cross-plots have also been prepared, showing the effect of temperature on product distribution at conversion levels of 50, 60, and 70 per cent.

The general effect of increasing reactor temperature at a given conversion is to produce less catalyst deposit and greater quantities of light hydrocarbon fractions having higher olefin contents. The liquid products contain higher concentrations of unsaturated components, and the clear octane number of the gasoline is increased.

### Fractionator Tray Performance And Design

CYRIL O. RHYS, JR., Standard Oil Development Co., Elizabeth, N. J., and H. L. MINICH, Esso Standard Oil Co., Linden, N. J.

AN experimental program was undertaken to establish the fundamental principles of bell-cap tray operation. This study was carried out on a 16-ft. 6-in. diameter half tray operating on air and water.

It was found that hold-down bars running across the top of the caps transverse to the direction of normal liquid flow resulted in high liquid gradients. A substantial improvement in liquid-vapor distribution was effected by eliminating the hold down bars and providing individual hold down bolts to secure the caps to the tray. The tests indicated that further increases in the vapor-liquid capacity of fractionating trays could be accomplished.

Correlation and analysis of the data permitted the development of methods for determining liquid gradient, tray pressure drop, and height of liquid in the downcomers. Application of these principles to both new and existing commercial refinery units has confirmed the soundness of these principles established on air and water when applied to hydrocarbon liquids and vapors.

### Generalized Correlation of Process Variable in Multi-Component Solvent Extraction

CLYDE BERG, MARTIN MANDERS, and ROBERT SWITZER, Union Oil Co. of California, Los Angeles.

USE of the overlap coefficient is developed as a basic factor in the correlation of the process variables of multicomponent solvent extraction. This correlation generalizes the relationship between the reflux ratio and number of stages of extraction operation required to produce a product of a given specification. By this method the optimum design of a given solvent extraction installation can be determined by the economic balance between solvent circulation, number of stages, and the quality of raffinate and extract. It is also of value in determining the effect of changes to existing facilities, such as that which might be effected by adding an additional extraction tower to an existing plant.

The correlation is applied to pilot plant data on the furfural extraction of S.A.E. 40 dewaxed lubricating oil distillate from the Los Angeles basin crude. Fundamental extraction characteristics for the pilot-plant extraction tower are developed from water extraction of the binary system methyl-ethyl-ketone naphtha.

### Conversion and Product Distribution Thermofor Catalytic Cracking

R. A. McKEAN and L. F. GRANDEY, Union Oil Co. of California.

IN the past few years catalytic cracking has assumed an increasingly important role in petroleum refining. A constant problem to the refiner is how to secure the maximum yield of the most desirable product, gasoline and butylenes, while minimizing the formation of the by-products, coke and gas.

A two-step procedure is presented to permit calculation of the effect of process variables on the yield of products from Thermofor catalytic cracking. The first step is an improved correlation of feed-stock conversion with space velocity and catalyst-oil ratio. This correlation is based on an empirical formula tested with pilot plant and commercial data. The second step is a method of analyzing yield structures. The authors introduce the concept of "ultimate yield," use the graphical origin and obtain data in both the "overcracked" and "normal cracking" regions. By this method it is possible to obtain a fairly complete idea of the yield structure of a particular changing stock from a comparatively few data points.

Steps 1 and 2 are used together in solving any particular commercial problem.

### Correlations of Product Distribution and Process Variables in Moving-Bed Catalytic Cracking

J. W. SCHALL, J. C. DART, and C. G. KIRKBRIDE, Houdry Process Corp., Marcus Hook, Pa.

THE paper presents relationships between yields of the various products from the catalytic cracking reaction as effected by the process variables, temperature, space rate, and catalyst-to-oil ratio.

The basic correlations of product distribution and process variables were developed from data obtained from once-through cracking on an East Texas heavy gas oil over equilibrium bead catalyst in a moving-bed pilot plant. Process variables were varied individually to cover a range in space rate of 0.1—2.0 (vol./hr./vol.), catalyst-to-oil ratio of 1.5—29 (vol./vol.), and average cracking temperatures of 850° and 900° F.

The interrelationships of the various products of the cracking reaction are presented for the two temperatures. Process variables of space rate, catalyst-to-oil ratio, and temperature have been correlated with the yield of total gas ($C_4$ and lighter product) plus coke. These correlations make it possible to (1) predict the entire product distribution at a given temperature when the yield of one of the major products is known; (2) predict the entire distribution at a given temperature, space rate, and catalyst to oil ratio; and (3) predict the space rate and catalyst to oil ratio at a given temperature when the yield of one of the major products is known.

Although the correlations presented are based on only one charge stock and one catalyst, they are so devised that they may be made applicable to any charge stock and/or catalyst by determining the cracking characteristics of the given stock and/or catalyst with a small number (3-5) of properly chosen pilot-plant runs.

# Attention Purchasing Agents

Late in 1948 we purchased a recycling plant and approximately 27 miles of high pressure gas lines located approximately three miles south of Alice, Texas. After earmarking certain equipment and lines for expansion of our Stratton Plant in Nueces County and the laying of certain high pressure gas lines, we have left the following lines and items of equipment that are in excellent condition. All pipe has been thoroughly cleaned, flame beveled, and primed, and is available for buyer's prompt inspection. Price on all pipe is based upon acquisition cost plus cost of recovery. Equipment is offered at substantial savings. Following is a list of pipe and equipment with prices f.o.b. plant yard, three miles south of Alice, Texas, on U. S. Highway 281, all offered subject to prior sale:

## PIPE

| | Price C' |
|---|---|
| 10,400'—4½" OD 14.98# Mixed EW & Smls, SRL, R2 & DRL | $140.12 |
| 15,600'—7" OD 19.54# H-40 Smls., R-2 | 183.18 |
| 3,060'—7" OD 23.64# Grade C R-2 | 210.46 |
| 660'—7" OD 25.66# J-55 R2 | 224.75 |
| 31,790'—7" OD 27.73# Smls R2 (Analysis available) | 231.49 |
| 2,028'—4½" OD 19.73# Smls, SRL | 167.62 |
| 1,042'—8⅝" OD 67.8# ditto | 616.21 |

## EQUIPMENT

| | Price Each |
|---|---|
| 9—6" Fig. 3049 Nordstrom Valves complete with RTJ WN Flanges, Bolts and Rings | $405.90 |
| 5—8" Fig. 3049 Ditto | $660.15 |
| 4—10,000-bbl. Welded Tanks | $3,500.00 |
| 1—2,000-bbl. Ditto | $500.00 |
| 3—Clark Comp. Cyl. Bed Sections for RA-6 | $300.00 |

## EQUIPMENT—Continued

| | |
|---|---|
| 1—Union Iron Works 20,000#/hr 300 psig WP, Type L, 3-Drm WT Boiler, Comp w/ stack, breeching, gas burner & controls | $12,000.00 |
| 1—3' x 41' high, 90 psig WP, 22 tray absorber | $1,500.00 |
| 1—2' 6" x 63'-75 psig WP, 36-tray debutanizer, complete w/ reboiler, reflux cond., accumulator and Pumps | $6,500.00 |
| 1—Hudson Forced Draft Cooling Tower, Type 5-C-FD-18-20-24 Bay Complete w/5 Terry Turbine Driven Fans | $4,500.00 |
| 1—80 HP Terry Turbine w/ 35 KVA E.M. Generator | $750.00 |
| 1—100 BHP International Gas Engine w/35 KVA EM Generator Complete w/ volt. reg & Switchboard | $750.00 |
| 4—Clark 4⅜" x 14" VSF Compressor Cylinders | $3,000.00 |

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# Cost-imating

A WEEKLY FEATURE OF THE OIL ANG GAS JOURNAL

# Clay and Cement Pipe

**COST-IMATING RELATED TO STEEL**

**The following Refiner's Cost-imating Notebook have pertained to the costs of various steel constructions:**

**No. 3—November 4, page 111, Construction Steel**
**No. 5—November 18, page 123, Storage Tanks**
**No. 6—November 25, page 133, Petrochemical and Small Tanks**
**No. 9—December 16, page 113, Vessels**
**No. 10—December 23, page 81, Special Vessels**
**No. 11—December 30, page 277, Fractionating Towers**
**No. 12—January 6, 1949, page 93, Estimate of a Fractionator**
**No. 13—January 13, 1949, page 101, Tower Insulation and Platforms**
**No. 18—February 17, 1949, page 137, Ladders, Walkways, and Platforms**

**The current schedule of Cost-imating topics is:**

**No. 15—January 27—Pipe Insulation**
**No. 16—February 3—Insulation for Cold—1**
**No. 17—February 10—Covers for Fittings—2**
**No. 18—February 17—Ladders, Walkways, and Platforms**
**No. 19—February 24—Depreciation Rates—Refining**
**No. 20—March 3—Clay and Cement Pipe**
**No. 21—March 10—Depreciation Rates—Petroleum**
**No. 22—March 17—Cost of Buildings**
**No. 23—March 24—Pump and Control Houses**

**COST INDEXES—1946 = 100**

| | Brick and tile* material | Cement* material | Refinery† labor |
|---|---|---|---|
| 1926 | 81 | 96 | 58 |
| 1928 | 78 | 89 | 57 |
| 1929 | 77 | 85 | 59 |
| 1930 | 73 | 86 | 57 |
| 1931 | 68 | 72 | 57 |
| 1932 | 63 | 71 | 48 |
| 1933 | 64 | 84 | 49 |
| 1934 | 70 | 89 | 55 |
| 1935 | 72 | 89 | 58 |
| 1936 | 72 | 88 | 60 |
| 1937 | 76 | 85 | 65 |
| 1938 | 74 | 86 | 67 |
| 1939 | 74 | 88 | 68 |
| 1940 | 73 | 87 | 69 |
| 1941 | 76 | 88 | 71 |
| 1942 | 80 | 90 | 79 |
| 1943 | 80 | 90 | 87 |
| 1944 | 83 | 92 | 90 |
| 1945 | 91 | 95 | 94 |
| 1946 | 100 | 100 | 100 |
| 1947 | 114 | 111 | 119 |
| 1948 est. | 123 | 122 | 154 |

*Industrial Report—Lumber, Office Domestic Commerce, Forest Products Section, U. S. Dept. Commerce. †Cost-imating No. 1, October 21, 1948, page 141.

THE 1946 material costs of clay, cement, and cement-lined pipe are indicated in Tables 1, 2, and 3. Labor costs vary widely but in general are about 15 cents per foot for small pipe that must be joined by cementing. However, at sizes of 18-24 in. the pipe is so heavy that it would need to be handled by frame, etc. Thus, the pipe might be lowered into a trench by three men working together using an A-frame. Such handling nearly doubles the labor cost. The cost of digging trenches, etc., on a small scale is indicated in Table 4.

Access holes to sewers vary widely in construction. However, the complete cost including excavation, concrete, forms, and openings, in 6-in. concrete is somewhat as follows:

| Size— | $ each, 1946 M | L | M & L |
|---|---|---|---|
| 2 by 2 by 3 | 18 | 25 | 43 |
| 4 by 4 by 6 | 54 | 69 | 123 |

Similarly, the cost of a septic tank complete except laterals, is about $520 (material $220 and labor $300). The septic tank is a 6 by 6-ft. box 15 ft. long.

**TABLE 1—MATERIAL COST OF CLAY TILE, 1946**

| Pipe size (in.) | Lengths (ft.) | Ct. per ft. Bell and spigot | Ct. per ft. Plain end |
|---|---|---|---|
| 4 | 2 | 22 | 5 |
| 6 | 2½ | 31 | 8 |
| 8 | 2½ | 44 | ... |
| 10 | 2½ | 62 | ... |
| 12 | 2½ | 79 | ... |
| 15 | 2½ | 132 | ... |

**TABLE 2—MATERIAL COST OF CONCRETE PIPE, 1946**

| Pipe size (in.) | Tongue and groove Thickness (in.) | Tongue and groove $ per ft. | Reinforced $ per ft. |
|---|---|---|---|
| 8 | ⅞ | .24 | ... |
| 10 | 1 | .40 | ... |
| 12 | 1 | .48 | .88 |
| 15 | 2 | .68 | 1.00 |
| 18 | 2¼ | .84 | 1.20 |
| 21 | 2¼ | .92 | 1.60 |
| 24 | 2¾ | 1.32 | 1.80 |
| 30 | ... | ... | 2.56 |
| 36 | ... | ... | 3.48 |

**TABLE 3—COST OF CEMENT-LINED PIPE (LINING ONLY), 1946**

| Pipe size (in.) | Lining only, ct. per ft. |
|---|---|
| ½ to 1½ | 7.4 |
| 2 | 8.6 |
| 2½ | 10.7 |
| 3 | 12.7 |
| 4 | 17.1 |
| 5 to 7 | 25.5 |
| 8 | 37.0 |
| 10 | 64.0 |
| 12 | 96.0 |

**TABLE 4—SIMPLE HAND EXCAVATION AND SHOVELING, 1946**

| Excavation: | Cu. yd./ man hr. | $/cu. yd.* |
|---|---|---|
| Medium soil, sand or loam | 1.0 | 0.90-1.10 |
| Heavy soil or clay | .7 | 1.28-1.57 |
| Hard pan | .5 | 1.80-2.20 |
| Shoveling (loose) into trucks: | | |
| Medium soil, sand or loam | 1.25 | 1.12-1.37 |
| Heavy soil or clay | 1.00 | .90-1.10 |
| Hard pan | .85 | .76- .93 |

*At 90 cents to $1.10 per hour.

**No. 20 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa**

# Line Flow *Can't* Seep Into Lubricating Ducts of PITTSBURGH'S

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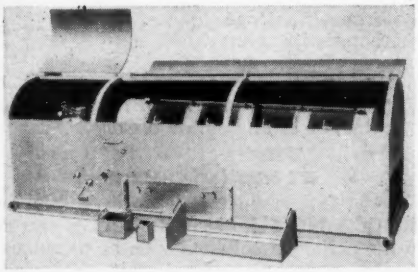
# OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

**by Dan B. Miller**

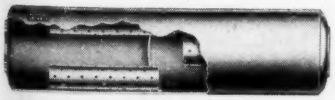
**(1) SHALE SEPARATOR** for deep drilling is being tested in North Texas fields. This new separator is made primarily for deep-hole operations but is readily adaptable to all drilling requirements. Because of its ability to handle with uniform effectiveness any mud volume



coming from the well, it will become an important part of deep drilling. The separator incorporates the use of a ¾-hp. electric motor that performs the dual role of pumping mud from the bottom of the separator to spray the screens on the separator and also turning the screens for proper shale separation and mud recovery. No additional water is necessary as the mud is forced through a jet and the original specifications of the mixture are retained. Screens are interchangeable and give mesh graduations from fine to medium and coarse. The explosionproof motor operates the pump at 1,500 r.p.m., while the screen drum makes 18 r.p.m. Skidmounted, the separator weighs 2,450 lb. and is moved as a single unit. *Thompson Tool Co.*

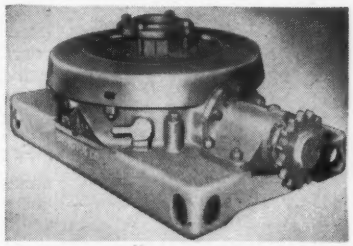
IT'S NEW ✓ CHECK IT

**(2) AIR INTAKE SNUBBERS** are used on all two and four-stroke-cycle stationary and marine engines (diesel, gas, or dual fuel). They are also designed for the intake of all centrifugal and positive-displacement compressors and blowers. Designated as series SDA, these units are available in pipe sizes from 1 to 30 in., inclusive. Intake snubbers operate on the same principal as exhaust snubbers. Incoming pulses of air are snubbed so that the oscillating flow of air is smoother to a unidirectional flow. There is no appreciable restriction of the intake pipe. Vibration and chugging are eliminated. No tuning of the air intake system is necessary. *Burgess-Manning Co.*



IT'S NEW ✓ CHECK IT

**(3) OB-12 OILBATH ROTARIES** make possible exceptional efficiency in shallow drilling and deep well servicing. The OB-12 rotary is available in a short shaft, the OB-12-S (shown), and a long shaft, the OB-12-L. Both models have a 12-in. table opening, and are recommended for drilling to 3,000 ft. Built to be short and compact, the OB-12-S model has a distance of 29 in. from center of table to center of sprocket. The OB-12-L model has a dimension of 44 in. center to center. The table is supported by an angular contact ball bearing operating in an oil bath on which all rotating loads are carried. All upthrust loads are placed on a bronze bushing. OB-12-S rotary weighs approximately 2,100 lb.; the OB-12-L weighs approximately 2,650 lb. Rated dead-load capacity for both at 0 r.p.m. is 100 tons. *Brewster Co.*



IT'S NEW ✓ CHECK IT

**(4) EXPLOSIONPROOF ROTARY SNAP SWITCH.** The versatile quick-make, quick-break, rotary-snap switches are now available in explosionproof dust-tight, vapor-tight, weatherproof housings for hazardous locations. The assembly may be surface mounted with the switch handle on the dome, as shown, or can be furnished with the switch shaft inverted and projecting through the base for panel mounting. Housings are standard cases with an alumi-

**The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.**

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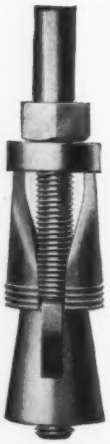
num dome which screws onto a cast iron base. Standard conduit connections are provided—¾ in. for the shallow case and 1 in. for the deep case. *Electro Switch Corp.*

IT'S NEW CHECK IT

**(5) "O" RING SEAL.** A new type of protection for sensitive pressure recorders, and indicators, made for installation in the line between recorder outlet and measuring element, is designed to protect all types of gage elements from corrosion, clogging, and shock of pulsations. Two types of "O" Ring Seals are manufactured. Type H is engineered for operating pressures from 0-500 up to 0-20,000 psi., and can be used where mud, acids, corrosive mediums, and heavy viscous fluids are present, without the risk of clogging or corroding the measuring element. Type L is for use on pressures from 0.50 in. up to 400 psi. Sizes available are for ¼ and ½-in. connections. *Industrial Instrument Co.*

IT'S NEW CHECK IT

**(6) NEW ROCK ANCHOR** meets a demand of the industry for a positive and permanent holddown for pipeline construction in solid rock, foundation bolts, and many other applications in the oil and gas industry. It is made of certified malleable and is so constructed that when load is applied, expanding forces anchor wings against the walls of the hole to effect a positive grip at all times. Corrugations on the bearing surfaces of the wings prevent any slippage. The standard 2-in. size expands to 2⅝ in. and is equipped with ¾-in. rod. Standard 3-in. size expands to 3⅝ in. and is equipped with 1 or 1¼-in. rods. Actual tests of 2-in. size show a rod-breaking strength of 20,000 lb., no slippage in the anchor. The anchor can be set and expanded at any depth in the hole and can be furnished with either eye or threaded-end rods. *Grip-Tite Manufacturing Co.*

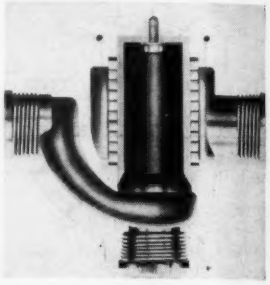


IT'S NEW CHECK IT

**(7) WHITE MAGIC OIL-EMULSION MUD** for top-hole drilling. When added to a water-base clay mud, with crude or refined oil, White Magic produces a low-water-loss mud with excellent viscosity and gel properties, capable of being built to any desired weight up to 130 lb. per cubic foot (17.3 lb. per gallon). When desired, it is possible to obtain a zero A.P.I. fluid loss with a White Magic emulsion. It may be injected into the pits through a hopper in the normal manner. Drilling need not be interrupted while the emulsion is being made. *Oil Base, Inc.*

IT'S NEW CHECK IT

**(8) NEW TYPE CHECK VALVE** gives a positive seal even after sealing surfaces have been damaged by corrosion or fluid cuttings. Seals successfully against paraffin deposits. Instead of replacing the entire valve, remove bonnet and replace screen and packer cup. Screen and seal can be changed in 1 minute with ordinary hammer. It is not necessary to remove the valve from the line. Other characteristics are: no moving metal parts, no seats, 100 per cent coefficient of flow, low pressure drop, no hammer, can be installed in line, or as an "ell." *Val Corp.*

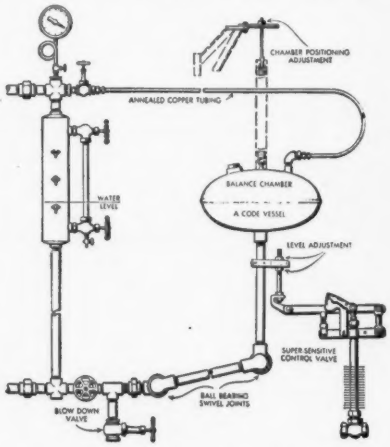


IT'S NEW CHECK IT

**(9) MOROCCO NO-SLIP FLOOR MAT** is extremely resistant to the action of solvents such as petroleum, gasoline, kerosine, naphtha, furfural, salt water, acids and alkalies. It has fine insulating qualities, and is nonskid even when covered with oil. This material can be applied to any hard surface, e.g., wood, steel, and concrete and is ideal for use on catwalks, steps, ramps, ship decks, derrick platforms, or any place where people walk or stand. *W. D. Moore Co.*

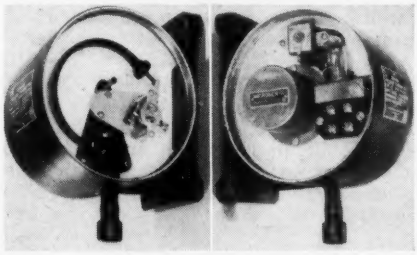
IT'S NEW CHECK IT

**(10) WEIGHT-O-WATER LIQUID-LEVEL CONTROL.** An entirely new principle of boiler feed-water control uses the weight of water as a force to motivate the feed-water valve. Since no heat is required to operate it, heat and cold have no effect on its performance. Control is so sensitive that a drop of as little as ⅛ in. in the boiler will actuate the valve. The extreme sensitivity of the valve is afforded by the elimination of any stuffing gland and the substitution of an 8-in. neoprene stem seal. Fins on bonnet extension of valve dissipate heat and give the seal a long life. *J. A. Campbell Co.*




IT'S NEW CHECK IT

**(11) ELECTRONIC PRESSURE TRANSMITTER.** Pressure motion is picked up from the tip of a Bourdon tube and by means of the Microsen electromechanical relay, this motion is converted into a stable and accurate d.c. signal



which can be indicated or recorded with milliampere, or millivolt instruments. Convenience and ease of reading is secured, since the electrical output being directly proportional to the movement of the Bourdon tube, it becomes possible to use uniformly graduated scales. Power consumption is only 2 watts. Maintenance is made simple by the case construction which permits servicing either the pressure system or the electrical system independently of each other. Standard pressure ranges up to 50,000 lb. are available. *Manning, Maxwell & Moore, Inc.*

IT'S NEW CHECK IT

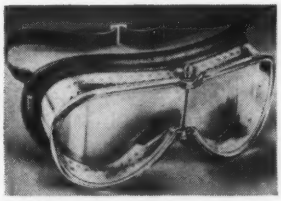
**(12) COMBINATION DRIVES FOR COOLING-TOWER SERVICE.** Right-angle gear drive for economical operation at pump speeds as low as 1,200 r.p.m. Can be used with either available steam or horizontal electric-motor-driven turbine pumps. *Johnson Gear & Manufacturing Co.*

IT'S NEW CHECK IT

**(13) RATO-CHLOR CHLORINATOR.** Based on the modern science of instrumentation, the dispenser is assembled from standard components each of which is particularly designed for chlorine service. It is a "dry vacuum" chlorine dispenser using no water seals, bell jars, poppets, or similar devices. Chlorine from cylinder, drum, or tank car is filtered first to remove gum-forming hydrocarbon impurities that might deposit "taffy" in working parts. It is then delivered to the Rato-Chlor unit. Flow rate is set by adjusting a regulating valve and is measured by a Flowrator meter calibrated to indicate pounds per day of chlorine vapor. A differential pressure-regulating valve completes the flow-control element that maintains constant rate of flow. Vacuum is created by an injector and kept uniform by a vacuum regulating valve. The ejector also mixes a dilute chlorine-water solution which it discharges, through a distributor, into the stream being chlorinated. *Fischer & Porter Co.*

IT'S NEW CHECK IT

**(14) PANORAM GOGGLE** is now available with rubber cushions to provide extra wearing comfort. The cushions are molded to the exact shape of the Panoram eye-cup and can be slipped into place easily with no need for stapling, sewing, or cementing. Once in place, they stay, but can be replaced in a few seconds. Made of soft, pliable, nontoxic, neoprene sponge rubber, the cushions assure extra protection against dust and flying particles. Also available is a new, pouch-type plastic case to protect Panoram goggles from scratches, dust and dirt when goggle is not in use. The case has heavily stitched, reinforced edges and a flap with a snap hook. *American Optical Co.*

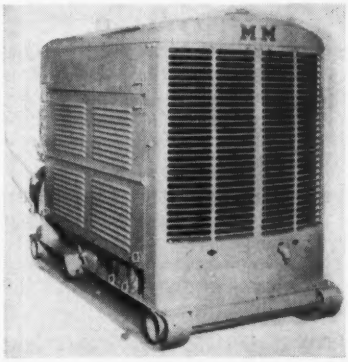


IT'S NEW CHECK IT

**(15) COATED METAL RECORDING CHART** for use in meters and recording instruments which are installed to operate under extreme temperature, pressure, and other adverse physical conditions. Chart will not shrink, expand, deteriorate, or become deformed under atmospheric changes or by coming in contact with moisture, hydrocarbons, or corrosive elements; nor will the patented coated surface crack, peel, or flake. The coated surface is extremely sensitive to very light stylus, or dry pen, pressure. Constant or erratic stylus movements can be recorded in a fine solid line, consistent in width. Charts are manufactured in thicknesses of 0.002 to 0.003 in., and can be made as thin as 0.001 to 0.0015 in., if desired. *Otis Pressure Control, Inc.*

IT'S NEW CHECK IT

**(16) M M MODEL 1210-12A POWER UNIT.** Foremost feature is heavy-duty over-all design. Special attention has been devoted to making engine parts with a large safety factor. Unit is particularly adapted to heavy duty applications. It has removable cylinder blocks and heads that are cast in pairs. Maintenance work is simplified, and replacement costs are low when such work becomes necessary. The close grain cast iron provides the best material for cylinders. Cast iron has graphite inhibitive and oil retaining properties which improve lubrication. *Minneapolis-Moline Power Implement Co.*




IT'S NEW CHECK IT

**(17) ELECTRICAL THERMOMETER.** Known as model 918, this thermometer employs a sensing element known as a resistor bulb which is readily placed in tanks and machines, with the direct-indicating instrument mounted any reasonble distance away from the bulb. With the incorporation of a selector switch and multiple bulbs, a number of temperature measure-

ments are possible while using but one indicating instrument. It is a ratio-type instrument with a scale over 5 in. long, having excellent control and damping, and showing quick response to temperature variations. It is designed for use on 100-130 volts, 50-60 cycles a.c. and is not affected by normal line voltage variation. It can also be supplied for use on d.c. *Weston Electrical Instrument Corp.*

IT'S NEW ✓ CHECK IT

## TRADE LITERATURE

**(18) SOLVING STEAM-TRAP PROBLEMS.** Contains detailed information aiding the user in selecting the right size trap, and in following the correct trapping practice for unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives such information as trap capacity factors, how to determine the lift of a trap, and condensate rates. *V. D. Anderson Co.*

**(19) MICARTA SEGMENTAL RINGS** for use in gas compressors, improves ring service in the transmission of wet and sour gas. New folder describes how Micarta does not oxidize in acid or alkaline gases. Data cover grade selection, ring details, expanders, results, and how to order. *F. H. Maloney Co.*

**(20) HANDY SELECTION CHART.** Based on normal applications handling air with atmospheric intake pressure. Simplifies selection of proper size compressor for average industrial use, with quick comparison between discharge pressure pounds per square inch gage, piston displacement cubic feet per minute, and shows recommended compressor bore and stroke in inches. *Worthington Pump & Machinery Corp.*

**(21) ZEROLITE INSULATION** presents a new insulation for low-temperature service. It provides essential data on sizes, temperature limits, conductivity, strength, water absorption, and combustibility. Also included are suggested uses for Zerolite which comes in the form of sheets, lagging, and pipe insulation. *Johns-Manville.*

**(22) PETROLEUM ISSUE OF PRODUCTION ROAD** is the interesting story of the production of oil—from the first survey to the refined product. This 28-page pictorial review of the oil industry contains sections devoted to the exploration, drilling, pumping, piping, and refining of oil. *Twin Disc Clutch Co.*

**(23) GUIDE TO CORRECT INSTRUMENT SELECTION.** In addition to giving a comprehensive bird's-eye view of the company's entire industrial instrument line, the field of application of each type of instrument is covered as well as its principle of operation and range limits. *Taylor Instrument Cos.*

**(24) ENGINES AND POWER UNITS.** Industrial engines and equipment for their operation on gasoline, kerosine, distillate, or natural gas in a wide variety of applications, are described and shown in a new 12-page catalog covering four carburetor-type engines. *International Harvester Co.*

IT'S NEW ✓ CHECK IT

**(25) KARBATE HEAT EXCHANGERS.** The brochure shows the design and service of four types of heat exchangers using Karbate as protection against corrosive fluids and gases. Physical properties of Karbate and a table giving its resistance to a large number of acids, salt solutions, alkalies, organic compounds, and gases and mixtures are also shown. *Foster Wheeler Corp.*

**(26) MAINTENANCE CLEANING FOR OIL INDUSTRY.** Of particular interest is the discussion on sludge removal from oil lines, heat exchangers, and similar equipment by circulation of an actusol solution. Other subjects covered in this booklet are the cleaning of storage tanks, valves, lubricators, and paint stripping, steam cleaning, and similar operations. *Du Bois Co.*

**(27) HIGH-VACUUM APPARATUS.** Included in this 48-page pamphlet are suggestions for planning a high-vacuum system, information on pumping speed, explanation of merit factor, connections and speed of evacuation, low-pressure technique, and other data. *Central Scientific Co.*

**(28) SPEEDOMAX TYPE G INSTRUMENTS** describes these high-speed, high-sensitivity instruments for all uses for which they are now available. The pyrometers listed are supplied for measuring temperature with thermocouples, rayotubes, or thermohms. Illustrations in the catalog include: closeups showing design features; schematic diagrams of the Speedomax potentiometer and bridge circuit; and full-size, full-color sections of a round chart and a strip-chart, with the type of record available for each. *Leeds & Northrup Co.*

**(29) WELDING FITTINGS.** A loose-leaf binder catalog gives complete specifications, a diagram, and picture of the company's precision process fittings for welded lines. *Globe Steel Tubes Co.*

**(30) MASTER CONTRACT—GOOD OR BAD.** This eight-page dossier contains discussions on the advantages and disadvantages of awarding this type of contract for the construction of plants. There are articles dealing with the question as applied to process engineering, mechanical engineering, purchasing, use of labor, accounting, and foreign construction. *M. W. Kellogg Co.*

**(31) TRIOX** is a pamphlet detailing the uses of this chemical weed killer and recommendations as to applications for various purposes. *California Spray-Chemical Corp.*

**(32) STEEL PRODUCTS NO. 100.** A 26-page catalog illustrates several plant structures using the company's construction products, and includes detailed diagrams of construction features and illustrations of specialized products. *Allied Steel Products Corp.*

**(33) SERIES 71 DIESEL UNITS** is a folder giving diagrammatic installation dimensions, torque characteristics, horsepower and efficiency curves, and specifications of the units equipped with the torque converter, in three, four, and six-cylinder sizes. *Detroit Diesel Engine Division.*

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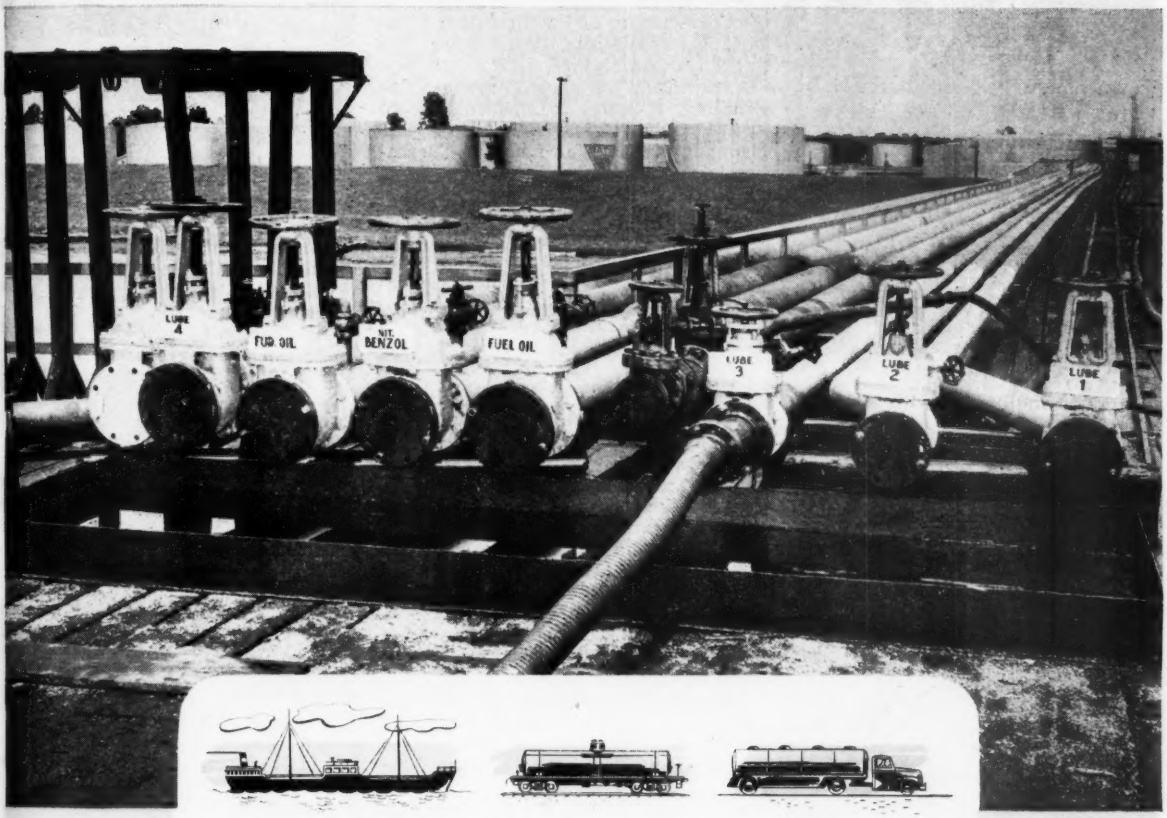




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# PIPE LINES

## P. G. & E. Prepares for 510-Mile Pipe-Line Project

Construction of Pacific Gas & Electric Co.'s 510-mile, 30 or 34-in. Topock, Ariz.-Milpitas, Calif., pipe line is contingent on several matters, including procural of permits from state and federal authorities. The company has been aiming at commencing the project in May or June. Pipe laying will be done by Bechtel-Price-Conyes.

In the initial project, to cost $63,000,000, there will be no compressor-station installations. The new system will supply the P. G. & E. system serving San Franciso.

## El Paso Natural to Lay 450 Miles of 30-In.

El Paso Natural Gas Co. will spend $95,000,000 in 1949 and 1950 on facilities for increasing deliveries to California, according to C. C. Cragin, vice president and general manager. Of this amount $56,000,000 is now in the bank. This 1949-1950 program will raise throughput by 430,000,000 cu. ft. to a total of 900,000,000 cu. ft. daily by pipe laying and compressor station installations.

By the Federal Power Commission permit issued this week, El Paso Natural's authorization has been raised by 250,000,000 cu. ft. from the 180,000,000 cu. ft. daily previously allowed by FPC.

Pipe-line construction for the 1949-1950 program will entail laying a total of 450 miles of 30-in. to loop the original 740-mile, 26-in. Eunice, N. M.-Blythe, Calif., line laid in 1947. During 1949, El Paso Natural will lay 390 miles; the remaining 60 miles will be laid in 1950.

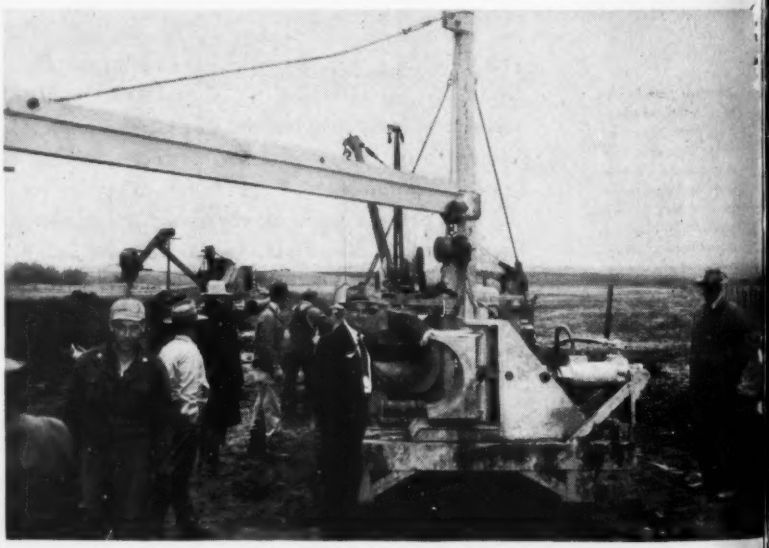
All of the line construction will be done by El Paso Natural Gas Co. crews. In April, two company spreads will go in the field. The company has equipment for a third spread which would be available if pipe deliveries would come at a rate which might warrant its operation.

A 102-mile, 26-in. crossover will be built by El Paso Natural to connect the Eunice-Blythe system with the line to be constructed by Pacific Gas & Electric Co. from Topock, Ariz., to Milpitas, Calif.

In 1950, San Juan Pipe Line Co., an El Paso Natural affiliate, expects to build a 450-mile, 24-in. line from Farmington, N. M., in the San Juan basin to P. G. & E. connection at Topock, Ariz., for the transmission of 150,000,000 cu. ft. daily.

## San Juan Basin Outlets Affected by Atomic Plans

In planning marketing of San Juan Basin gas, consideration must be given to future requirements of the



*John Coody at the Coody hydraulic machine bending 22-in. pipe being laid for the Smith Contracting Co. spread between Chelsea and Vinita, Okla., in the construction of a section of the Cushing, Okla.-Wood River, Ill., Ozark System (Shell Pipe Line Corp. and Texas Pipe Line Co.)*

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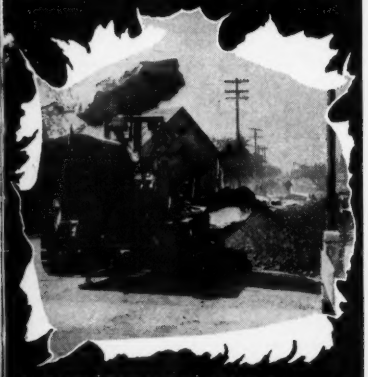

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atomic energy plants near Los Alamos, N. M., estimated at 500,000,000 cu. ft. in the next 25 years. The United States Government is concerned with allocations of San Juan Basin gas, both for the Los Alamos program and for Army and Navy establishments in California. Recognition of the latter needs, it is believed, will influence the Federal Power Commission to authorize the San Juan-P. G. & E. construction programs.

At present the principal pipe-line outlet from San Juan Basin is the Southern Union Gas Co. system which gathers through 4-in. and 8-in. lines to transmit through a combination 10-in. and 12-in. line to Albuquerque, N. M., The company has an 8-in. line from Albuquerque via Santa Fe to Los Alamos. Smaller systems from San Juan Basin include Durango Natural Gas Co.'s 6-in. line to Durango, Colo., and Aztec Natural Gas Co.'s 3-in. line to Aztec, N. M.

## Keystone Installs Radiotelephone System

PHILADELPHIA.—The first microwave radiotelephone and communications system to be used in the petroleum radio service will be set up by the Keystone Pipe Line Co., a wholly owned subsidiary of The Atlantic Refining Co.

The Federal Communications Commission has authorized the installation of the first five stations of the system, which eventually is expected to extend through Pennsylvania, New York and Ohio and will cost approximately $1,500,000, provided the initial facilities prove successful.

The Keystone company will construct the five stations, serving the pipe line for a distance of some 75 airline miles, which are expected to cost about $250,000. Strictly a fixed-station system, the terminal, intermediate and automatic relay facilities will operate on frequencies of 1,860, 1,910 and 1,960 megacycles. The Federal Telephone & Radio Corp., and Federal Telecommunication Laboratories engineered the project for the Keystone company and will furnish equipment for the stations.

Engineering by the Federal Telephone & Radio Corp., for the system was done in cooperation with J. D. Munton, manager of the communications department of the Atlantic Refining Co. and its subsidiaries. He pioneered in 1934 very high frequency shore to ship radiotelephone service with tugs owned by the Atlantic Refining Co., operating off Philadelphia, and he also was responsible for the initiation of use of Western Electric Co. dispatch, selective signaling telephone and carrier equipment for the southwestern petroleum operations of Atlantic.

The microwave facilities to be installed by the Keystone Co. make

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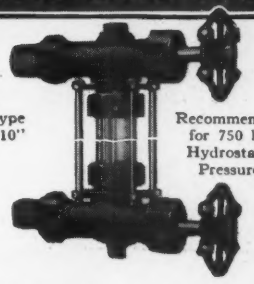

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up what is known as a "pulse-time multiplex and pulse-time modulation system" and the first units will consist of principal terminal stations at Philadelphia and Montello, an intermediate terminal station at Boot Pump Station in Chester County, and automatic relay stations at a point near Reading, all in Pennsylvania. At the Valley Forge station, the transmitter will be constructed with two separate antennas operating from a single transmitter.

## Texas Eastern Gets FPC Approval for Gas Boost

TEXAS EASTERN TRANSMISSION CORP. has been given approval by Federal Power Commission for construction plans to increase delivery capacity by 75,000,000 cu. ft. of gas daily through the Big Inch and Little Inch pipe lines.

With the increase, total delivery capacity of the two lines will be 500,000,000 cu. ft. of gas per day.

The commision, however, ordered Texas Eastern to sell the additional gas to nine companies.

Texas Eastern had planned originally to sell the gas only to East Ohio Gas Co., Peoples Natural Gas Co., and New York State Natural Gas Corp. known as the Consolidated companies.

FPC authorized sales to one existing customer in addition to the Consolidated group; this is United Natural Gas Co. of Oil City, Pa. United Natural serves retail customers in the Appalachian area, and wholesales to Iroquois Gas Corp., Buffalo, N. Y., and Pennsylvania Gas Co., Erie, Pa. United Natural has a Texas Eastern contract for up to 30,000,000 cu. ft. of gas daily.

Service was ordered by FPC to Texas Gas Transmission Corp., which wanted gas for emergency winter service, to utility customers in Indiana.

Daily amounts in cubic feet, ordered for the New Jersey utilities, is as follows: Public Service Electric & Gas Co., Newark, up to 4,500,000; Jersey Central Power & Light Co., Asbury Park, up to 5,000,000; South Jersey Gas Co., Atlantic City, up to 5,000,000; County Gas Co., serving Monmouth and Middlesex counties, up to 3,000,000; and City Gas Co. of New Jersey, serving Hunterdon and Mercer counties, up to 500,000.

Deliveries of up to 4,000,000 cu. ft. daily to the New York & Richmond Gas Co., serving Staten Island, were ordered on condition that the latter company is released from its obligation to buy natural gas from Transcontinental Gas Pipe Line Corp., which is starting to build an 1,840-mile pipe line from the Texas Gulf Coast to the New York metropolitan area.

## Oak Ridge Line Proposal Hearings Open March 9

Hearings on application of Tennessee Gas Transmission Co., and East Tennessee Natural Gas Co., for permit to construct natural-gas facilities which would be used to transport 60,000,000 cu. ft. of gas daily to the Atomic Energy Commission's Oak Ridge, Tenn., plant, will begin before the Federal Power Commission on March 9.

Under the proposed construction plan, East Tennessee would build approximately 170 miles of 22-in. pipe extending easterly from Tennessee Gas' pipe line in northwestern Tennessee to Oak Ridge, at an estimated cost of $9,976,000. Tennessee Gas, which would supply the 60,000,000 cu. ft. of gas to East Tennessee, proposes to construct approximately 156 miles of 30-in. main-line loops.

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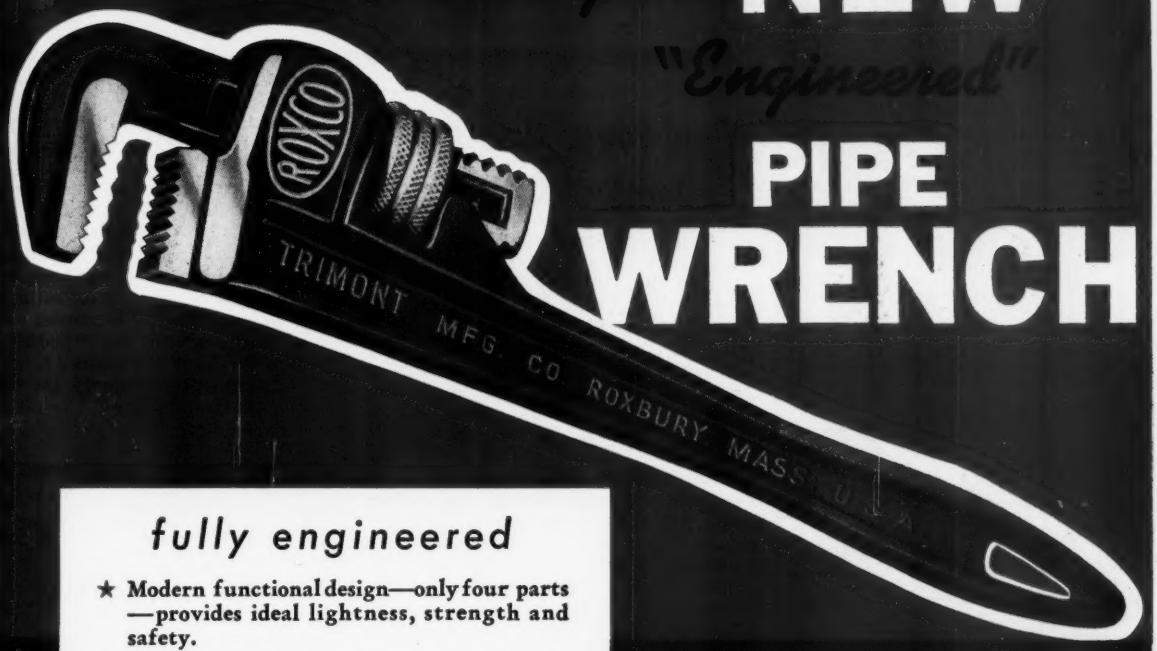


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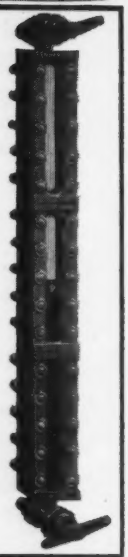

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# REFINING

## Fluid-Power Uses to Be Explored at Shell Plant

A new hydraulic-fluid laboratory, which will be used to study possibilities of fluid power, has been opened by Shell Oil Co., Inc., at the firm's Wood River, Ill., refinery.

F. S. Clulow, vice president, manufacturing, in announcing opening of the new facilities, stated that possibility that fluids may be used to transmit practically all power in cars of the future is likely. He said that since fluids can be made to supply a smooth power source for any job that is now done mechanically, "there is a tremendous field for the application of hydraulic power in automobiles, aircraft, and industrial machines." Clulow said that the laboratories will be used to develop fluids for such needs.

The laboratory is housed in a specially constructed building, and is the latest step in a program the company began 10 years ago for the purpose of developing fluids for the increasing number of hydraulic systems coming into use. Building and its equipment meet the need for special facilities in developing and testing hydraulic fluids, which must be made to extremely rigid specifications, Clulow said.

With automobile brakes and transmissions being operated hydraulically, Clulow said there is reason to believe fluids may eventually be used to operate built-in jacks, to power steering mechanisms, and to raise and lower tops, hoods, and windows. Other possible uses include operation of constant-speed generators, and of temperature-regulating devices. The first would extend battery life; the second would prolong engine life by insuring adequate temperature control during cold weather, light-load operations as well as in sustained driving at high temperature.

Clulow pointed out the need for continued research in hydraulics because of the wide and growing use of fluid power in both aviation and industry. Landing gear and controls on large planes are already operated hydraulically, and hydraulic drives are used to transmit power in many industrial machines. Demand for new and improved types of fluid is expected to grow as machine designs change in the future, the vice president said.

## Automatic Desulfo Plant to Be Built for Texas Firm

An automatic desulfo plant, with a potential capacity of 2,750,000 cu. ft. per day, which will automatically re-

*A new dome-type storage tank, right, first of its kind to be built in the United States, is designed to prevent loss of gasoline through evaporation, and has been put into use by Socony-Vacuum Oil Co., Inc., at its Worcester, Mass., plant. Dome section of the tank, like half of a giant rubber ball, contains a flexible diaphragm made of nylon coated with synthetic rubber. When vapors expand in the tank, as happens frequently in warm weather, diaphragm expands inside the steel dome and holds vapors within the tank. As temperatures drop, diaphragm contracts, but air is not drawn into the section where gasoline is stored. Air is always present between outer surface of the rubber ball and metal shell that houses it. The tank was built by Chicago Bridge & Iron Co.*

move excess hydrogen sulfide from natural gas, will be built by Dresser Industries for Panhandle Producing Co., San Antonio, Tex., near Stinnett, Tex.

The plant, to be erected by Stacey-Dresser engineering division, Cleveland, Ohio, will remove hydrogen sulfide from sour gas by an ethanolamine solution which flows through an absorber and a regenerator in a closed system. Sour gas enters the absorber, where hydrogen sulfide is transferred to the amine solution. Regeneration of the amine is accomplished by stripping, using a small part of sweet gas for the reboiler. Hydrogen sulfide is then vented to the atmosphere.

Work has already commenced at the plant site, and construction is scheduled to start early in April.

## January Oil-Tax Revenues Up Over January, 1948

WASHINGTON. — Revenue from the three federal oil taxes in January ran approximately $451,000 above the same month last year, it was announced this week by the Internal Revenue Bureau.

The bureau reported that a drop of $2,078,905 in gasoline-tax collections, which dropped to $28,772,439 from $30,851,344, was offset to that extent by increases of $2,527,171 on lubricating oils, to $7,988,019 from $5,460,848, and $290,559 on pipe-line transportation, to $1,103,872 from $813,313.

Receipts from these taxes for the first 7 months of the current fiscal year ran more than $22,000,000 ahead of the same period a year ago, the bureau reported.

Lubricating-oil revenue was $47,-949,409 against $44,435,810, an increase of $3,523,699; gasoline, $300,-457,219 against $282,810,959, an increase of $17,646,260, and pipe-line transportation, $11,066,575 against $9,-905,875, an increase of $1,160,700, the figures showed.

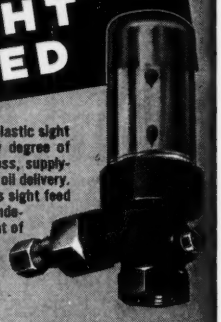
## U. S. Patents Covering Refining Now Available

Sixteen United States patents, covering inventions useful in manufacture of styrene and other artificial masses, are now available for licensing by the Office of Alien Property, Department of Justice, Atty. Gen. Tom C. Clark announced. Patents are obtainable on a royalty-free nonexclusive basis upon payment of an administrative fee of $15 per patent.

Titles to the patents formerly vested in I. G. Farbenindustrie A.G., its employes or subsidiaries, are now vested in the attorney general under authority granted by the Trading With the Enemy Act.

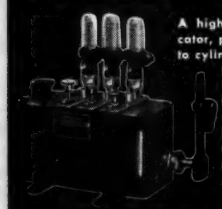
Complete information is available without cost pertaining to licensing of the patents.


McCORD "CLEARSITE" SIGHT FEED



McCord "Clearsite" plastic sight feeds provide a new degree of visibility and clearness, supplying positive proof of oil delivery. Due to its design this sight feed may be used as an independent sight at point of lubrication. As an accessory it can be added to any lubrication system. Specify "Clearsite."

McCORD "SF" LIQUID SIGHT FEED LUBRICATORS



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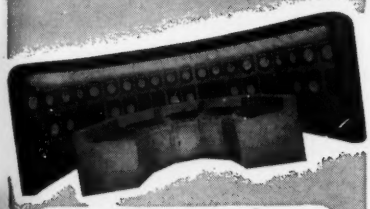

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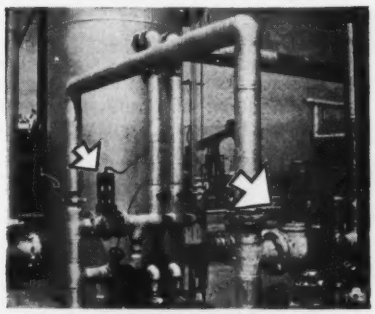

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# NATURAL GAS

## Texas Eastern Proposal Attacked by McGrath

TOM J. McGRATH, general counsel for Fuels Research Council, Inc., representing coal and railroad intervenors who oppose Texas Eastern Transmission Corp.'s proposal to increase Big Inch and Little Inch pipeline capacity by adding new loops, told the Federal Power Commission in Washington February 25 that "there has been lots of talk about buying flared gas, but 'economic feasibility' always seems to step in to stop it."

Texas Eastern told Congress it would use flared natural gas if the lines were put into natural-gas service. McGrath charges, however, that less than 6½ per cent of the proposed 771,000,000 cu. ft. capacity of the lines will be flared gas.

Representatives of the transmission company told Congress how they would contribute to conservation by purchasing gas that otherwise would be flared, McGrath told the commission. He declared that Texas Eastern will encounter shortages within the sixth year of operation of its enlarged system, and that FPC should require all applicants to prove that they possess or have under contract enough gas to meet their consumers' full requirements for 20 years.

Texas Eastern also proposes to increase compression facilities of the lines at various pumping stations. The line delivers natural gas to companies supplying home and industrial consumers in Indiana, Kentucky, Missouri, Ohio, Pennsylvania, West Virginia, and other areas.

McGrath said Texas Eastern does not have sufficient gas under contract now, and it appears that the pipe-line company is having difficulty in getting enough natural gas even for its present needs.

He pointed out that company officials admitted to FPC that 5 per cent of Texas Eastern's requirements will be met from so-called "spot gas" purchases. He said meeting requirements by "spot gas" is a precarious situation at best, since the purchaser may find "spot gas" to buy and he may not.

He criticized the commission's staff report on Texas Eastern's ability to buy gas, and described it as a "study that was given a once-over-lightly treatment." Staff did not go carefully into Texas Eastern's gas reserves, McGrath stated.

He said that "consumers, investors, and the public generally expect to and do rely upon this commission, in issuing certificates of public convenience and necessity to natural-gas companies, to issue certificates only to companies clearly showing ability to perform the services proposed."

He said that "if the industry is not willing to heed the admonitions of the commission instead of trying to circumvent them, I think their appeal should be made to Congress to change the law, rather than to this commission."

## SEC Orders Proceedings on Arkansas Natural Hearings

The Securities and Exchange Commission has ordered proceedings to consider and determine whether the corporate structure of Arkansas Natural Gas Corp. is unnecessarily complicated, and whether voting power among its security holders is unfairly or inequitably distributed. March 14 has been set as the date for filing answers to the allegations contained in the order authorizing the proceedings, and hearings will be scheduled by future order.

Arkansas Natural is a subsidiary of Cities Service Co., New York holding company.

SEC contends that no dividends were paid on common stock or on Class A common stock of Arkansas Natural since its organization in 1928, until 1948 when two quarterly dividends of 20 cents per share were declared and paid on each class of stock. SEC reports consolidated earnings, however, after preferred stock dividend requirements, during 1940-47 and for the 12 months ended February 29, 1948, were appreciable.

## Court Rules East Ohio Gas Co. Not Subject to FPC

WASHINGTON.—A three-man U. S. court of appeals in Washington held this week that the East Ohio Gas Co. is not a natural-gas company subject to regulation by the Federal Power Commission, reversing a commission order requiring the company to set up an entirely new accounting system for its properties.

A two-to-one opinion written by Justice Bennett Champ Clark with Justice E. Barrett Prettyman concurring and Justice Henry Edgerton dissenting pointing out that the company gets about 25 per cent of its gas from the Hope Natural Gas Co. and Panhandle Eastern Pipe Line Co., and the remainder from Ohio fields. But the sales by Hope and Panhandle are made within the borders of Ohio, the court pointed out, commenting that East Ohio Gas is "thoroughly and completely" regulated by the Ohio Public Utilities Commission.

# Natural Gasoline

## N.G.A.A. Odorization Rule Dropped on L.P.G. Products

Mandatory odorization of liquefied-petroleum gases by manufacturers is no longer required, under specifications of Natural Gasoline Association of America, according to a recent announcement by N.G.A.A. Secretary William F. Lowe. Long an integral part of official L.P.G. specifications promulgated by the association in 1931, provision requiring manufacturers to introduce an odorizing agent into the products previous to shipping, has now been dropped.

Reason for the move, Lowe announced, is the diversified use of L.P.G. for industrial uses. Originally these products were largely used for domestic purposes, but in recent years the demand from industry for relatively pure grades has grown to large proportions, the secretary said. Industrial uses are as raw materials, or in processing of other products. Presence of an odorant often makes the gases undesirable in these instances.

Increased demands of industry for unstenched material prompted N.G.A.A. to make introduction of an odorant optional with the manufacturer, in accordance with buyer's demands, Lowe said.

## Big Bubble Tower Installed At Texas Recycling Plant

One of the largest loads ever carried on a Texas highway rumbled through Odessa recently when an 87-ft. bubble tower was trucked to the Phillips Petroleum Co.'s gasoline plant northwest of Odessa, in Ector County. Gross weight of the load was estimated at 318,600 lb. by the Texas Highway Department.

The tower rested on a total of 74 tires, including 10 on the large truck that pulled the load, and the rest on eight-wheeled trailer units. Over-all length of the truck and tower was 110 ft. Weight of the tower was 240,000 lb.

The tower, which the highway department listed as weighing 365,999 lb. with moving equipment, is perhaps the largest Texas highway load. The recycling plant was moved from Carthage, Tex., to 5 miles northwest of Odessa.

VESSEL DIVISION

# NEWS

A. O. SMITH 75th ANNIVERSARY 1853 - 1948

A. O. SMITH Corporation

New York 17 • Philadelphia 5 • Pittsburgh 19 • Atlanta 3 • Chicago 4
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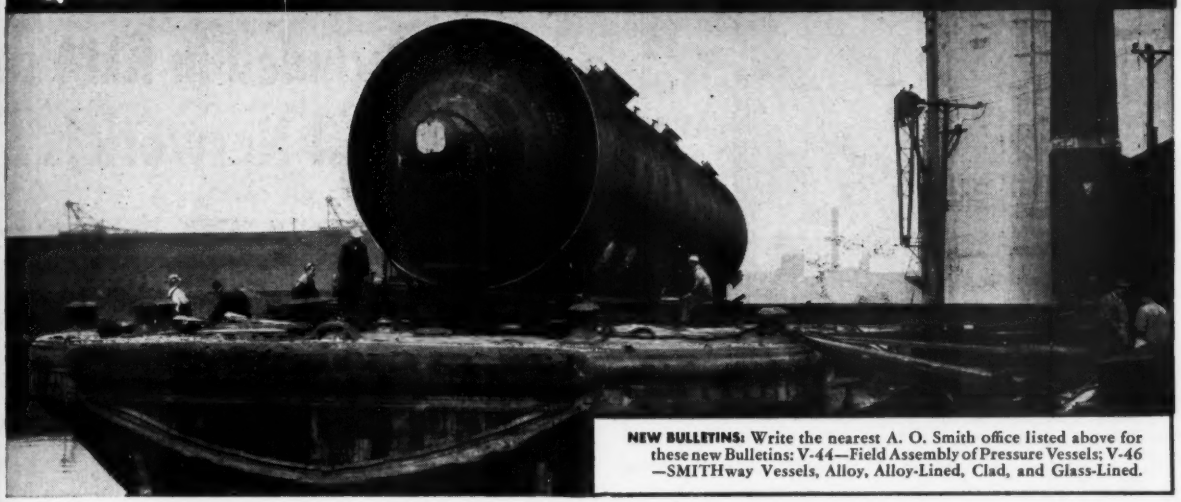

**NEW BULLETINS:** Write the nearest A. O. Smith office listed above for these new Bulletins: V-44—Field Assembly of Pressure Vessels; V-46—SMITHway Vessels, Alloy, Alloy-Lined, Clad, and Glass-Lined.

**BY WATER AND RAIL,** A. O. Smith ships pressure vessels for the petroleum, paper, and process industries. The SMITH-lined Fractionating Tower above, one of the largest shop-fabricated vessels ever built (16 ft. diameter by 116 ft. long, weighing over 320,000 lbs.), is going by barge to an oil refinery in the Chicago area.

**SOME 60 SMITHway PRESSURE VESSELS** for both low and high temperature service have been ordered during the last four years by one company to equip two new plants. This SMITHway Tower, three railroad cars long, 116 ft. by 7 ft., weighing 137,000 lbs., is one of the types of vessels furnished.

**THIS MAN KNOWS HIS CURVES:** For 23 years, Frank Hilke has been shaping, to exact diameters, the shell courses of SMITHway Pressure Vessels. He uses a variety of rolls which can produce any diameter needed for pressure vessels.

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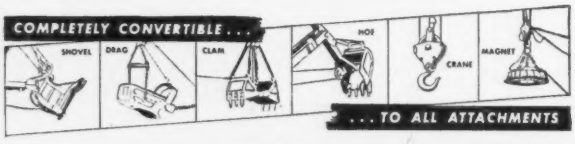


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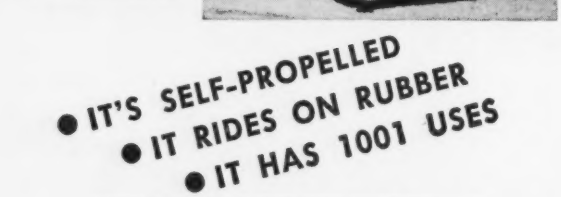


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| AR... | ARUBA..... | .....14:55..... | .....07:10..... |
| AR... | CURACAO.... | .....16:20..... | .....08:35..... |
| AR... | MARACAIBO.. | .....16:40..... | .....08:45..... |
| AR... | CARACAS .... | .....16:45..... | .....09:10..... |
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## Among the

# Drilling Contractors

**Skeeter and Curry Drilling Co.,** Longview, Tex., has contract on a 4,700-ft. wildcat for Guy Martin and Morty Freedman of Dallas, to be drilled as the 1 E. A. Dearing in the southwest corner of Delta County, East Texas. Location for the Paluxy test is 330 ft. from south and 200 ft. from west lines of the east half of the 80-acre tract, H. Ashbrook Survey, about 3 miles southeast of Commerce, Tex.

**Martin Harris Drilling Co.** has contract for deepening T. M. Kinney et al 1 Tung Oil in C NE NE 9-2s-11w, 3 miles northeast of Wiggins in Stone County, Mississippi.

**Thumb Drilling Co.** has contract for 1 E. Edwin Brehm, George A. and Edwina M. McLaren, SE SW NW 28-14n-8e, in Tuscola County, Michigan.

**Broyles Maxwell Drilling Co.,** Kilgore, Tex., will drill a joint Marble Falls test with J. R. Dockery, Cleveland, Miss., 2 miles southwest of Rising Star in Brown County, West Central Texas. The operation will be 1 W. E. Ezell, 990 ft. from south and 330 ft. from east lines, of the West half, Section 900, SA&MG Survey.

**General Petroleums, Ltd.,** has contract to drill Stanolind-Decalta-Perryvale 1 in LSD 14, 11-63-23w4, about 60 miles north of Edmonton, Alta., Canada.

**R. D. Evans & Son** has contract for Norman L. Stevens 1 Miles-Brown Comm., NE NE NW 33-1s-16w, Geneva County, Michigan.

**Goll, Graves & Mechling** has contract for Swan-King Oil Co. 2 Joe Compo et al, NW NW SW 2-16n-4e, in Bay County, Michigan.

**White-Webb Drilling Co.,** Dallas, Tex., was moving in at 1 C. H. Murphy Burton, Payne Survey, near Cedarvale in Kaufman County, East Texas.

**Gold Star Drilling Co.** has contract for Carter Oil Co. 2 Amelia Adams, SW SW SW 5-16n-17w, Oceana County, Michigan.

## MEETING OF CALIF. A. A. O. D. C.

*Pictured here are officers of the California A. A. O. D. C. at the recent meeting of the group held in Bakersfield, Calif.: K. L. Kellogg, vice president (California), E. J. Simonis, chairman, M. H. Stansbury, vice chairman, and Lee Daniel, secretary, (standing in background). E. J. Simonis presided at the sessions which included a discussion of the new drilling classes at Long Beach and Bakersfield by Art Heiser and Frank Jones. John Grant described the safety regulations as proposed by the Department of Industrial Safety. E. A. Bender discussed the new membership drive to bring additional contractors into the association*

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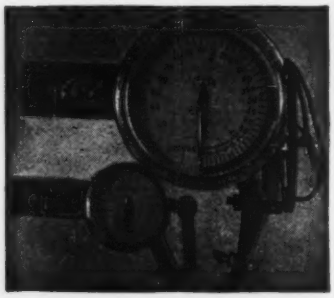

(Above) Super 500,000-lb. capacity, 14" dial. (Below) Packer Special, Capacity 40,000 lbs., 6" dial. 18 other models for every drilling, well servicing, or work-over need.

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## Trinity Drilling Co., Dallas, Texas

**History.**—Trinity Drilling Co. and the newly formed Trinity Production Co., now under the guidance of the Rush brothers — R. L., J. L., and M. H. — has been in the contract drilling business for over 25 years. It was organized in 1923 by another Rush brother, Jim, who died in 1942, and Grady Vaughn. Headquarters were then in Corsicana, Tex., and drilling operations spread over Oklahoma, Arkansas, and Texas. Trinity's drilling now is almost all confined to the Permian Basin of West Texas, although one rig is in operation in Archer County, North Texas. Company headquarters are in the Kirby Building, Dallas.

*R. L. RUSH*

**Personnel.**—R. L. Rush is president and J. L. Rush is vice president of the drilling company, while the order of titles is reversed for the production company. M. H. Rush, whose offices are in Odessa, is vice president of both companies. C. W. Denton, who has been with Trinity for 16 years, is secretary-treasurer of the two companies.

The Rush brothers gained their oil experience in the field. R. L. Rush, a director of the American Association of Oilwell Drilling Contractors, worked with Sinclair Oil Co. at Ranger, and was farm boss for Simms Oil Co. in West Texas. J. L. Rush was also with Sinclair, at Breckenridge.

Field office personnel include M. M. Conn, general superintendent, Midland, and J. W. Hall, drilling superintendent, Odessa.

**Equipment.**—Drilling outfits include one heavy-duty steam rig; two Franks portable diesel rotarys; three Emsco J-750 medium-duty diesel rigs; and three Emsco heavy-duty rigs rated at 12,500-ft. capacity. A twin-engine Lockheed Lodstar is used as an executive transport.

**W. Spencer Cook** will drill Ohio Oil Co. 1 Louis Wolf, SW NW NE 1-5s-17w, Berrien County, Michigan.

**Woods Drilling Co.** is drilling its own 1 Gilmore, NW SE SE 18-27n-1w, Kay County, Oklahoma.

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"ARMSTRONG BROS." Chain Tongs come in "Standard", "Reversible Jaw" and "Ideal" (V-jaw) types—in sizes for every need. Their drop-forged jaws have milled teeth, are hardened, tempered and tested for wearing qualities. They have heavy forged-in lugs that give extra bearing on the handles to which they are rigidly held by a large hardened steel bolt. The handles are forged and heat treated to the correct balance of stiffness and spring. Shackles are drop forged and chains proof-tested to ⅔ catalog strength (3,600 lbs. to 40,000 lbs.)

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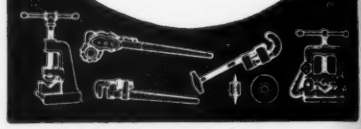



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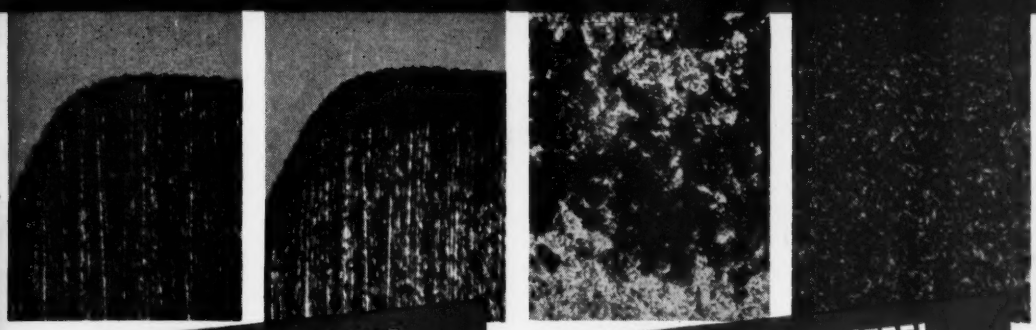
Photomicrograph of normal untreated machine thread
Microized thread shows penetration of micro film
Non-uniform structure that causes galling and failures
Uniform micro structure of steel in American Collars

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Here's protection that stops excessive thread galling! American Iron's Microizing Process for drill collar threads applies a protective micro film which not only treats the thread surfaces but also penetrates into the surface pores of the steel (as shown above)! This prevents adhesion of the two threaded connections! That's why our Microizing Process gives positive protection against excessive thread galling!

## HIGH ALLOY STEEL INSURES HIGHER IMPACT VALUES

Today's drill collars must have the very highest physical properties . . . properties that insure high impact values! That's why American Iron now uses a special high alloy steel to obtain a highly uniform micro structure (as shown above) from surface to thread areas. This fact, plus proper, full-length heat treating, results in the physical properties that insure high tensile and impact strengths in our drill collars.

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**ACCURATE BORING** of circulation hole insures a well-balanced collar throughout—one that'll hold whip to a minimum. That's why our collars are precision bored to rigid API specifications on our hydraulically controlled Gun Boring Machines!

**FULLY HEAT TREATED** for longer wear! After forging and straightening, collars are heated to normalizing temperature; reheated for hardening quench; tempered for uniform structure; again reheated for straightening and stress relief.

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# For Squeeze Cementing...

# UNAFLO
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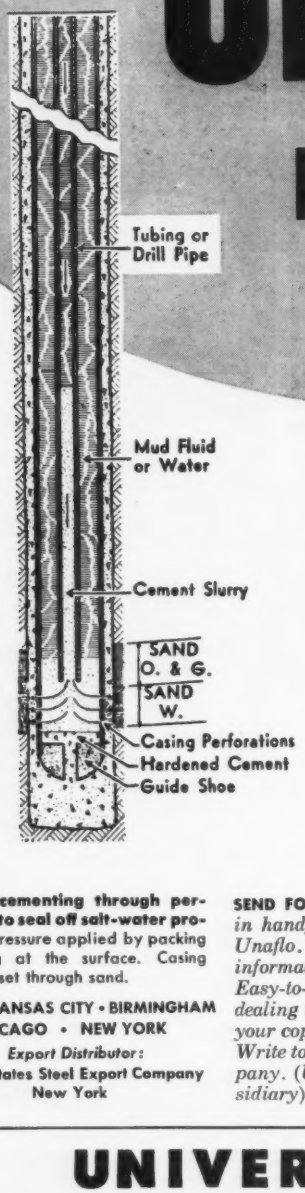
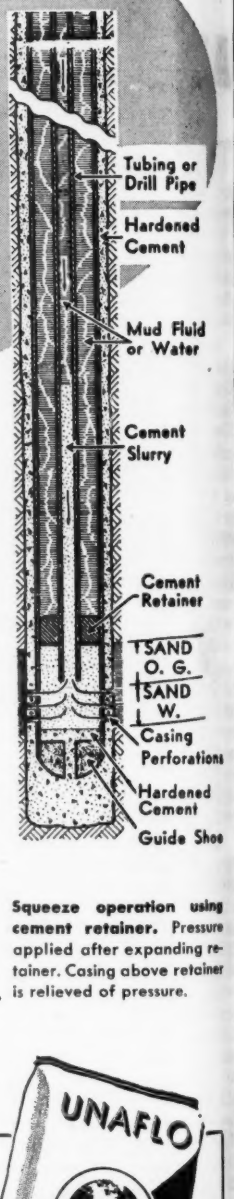



**A cement slurry** that remains fluid and pumpable throughout the cementing operation is vital on squeeze jobs to prevent seizing the pipe and permit reversing out the excess slurry. Sustained fluidity is especially important on jobs where the slurry comes to rest, or nearly so, under a combination of high temperature, high pressure and extended time, and where a considerable length of tubing or drill pipe must be worked in the body of the cement.

Unaflo cement, with its delayed, postponed, *retarded* set, does not stiffen prematurely. It remains fluid and pumpable throughout the entire cementing operation. Unaflo's retarded set provides ample time, even during emergencies, to get cement in place. Then, after retardation, it hardens normally to form an impervious seal.




**Squeeze cementing through perforations to seal off salt-water production.** Pressure applied by packing off tubing at the surface. Casing originally set through sand.

**Squeeze operation using cement retainer.** Pressure applied after expanding retainer. Casing above retainer is relieved of pressure.

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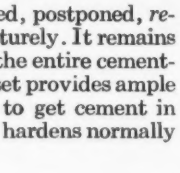


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# Exploration and Drilling

## Alberta Prospects Increasing by Leaps and Bounds

TO the uninitiated, the plains of Alberta may seem covered with ice and snow. But to oil-exploration men an area that has been getting "hotter" and "hotter" has now just about become a prairie fire. Right now they are attempting to evaluate the significance of four successful wildcats.

Starting in the northwest corner of the area involved, Stanolind Oil & Gas Co.-Imperial Oil Co., Ltd., 1 Barrhead, LSD 15, 10-58-5w5, looks like about a thousand-barrel-a-day producer in the Madison (Mississippi) lime; oil 24.4° gravity, and a little out of the ordinary for heavy oil production in Canada, gas estimated at 3,000,000 cu. ft. daily. Production is from pay section at 3,992-4,117 ft., ground elevation 2,268 ft. The well was drilled to 6,414 ft., and found nothing in what must have been a pretty full section of Devonian, judging from total depth. Top of Madison is 3,980 ft. Thickness of Madison is not known, but is believed to be thinner than previous dry holes generally south, west, and northwest, and thicker than a dry hole about 13 miles northeast. Location is just about 60 miles due west of Redwater field.

Moving to the northeast corner of the area, Imperial Oil Co., Ltd., 1 Bon Accord, LSD 1, 29-56-23w4, about 12 miles southwest of Redwater field and 18 miles northeast of the city of Edmonton, has almost a sure producer in the D-2 zone of the Devonian, with about 20 ft. of pay above the water line. On drill-stem test at 3,585-3,613 ft., 35°-gravity oil came to the surface in 39 minutes. A second test at 3,607-13 ft. recovered salt water. Coring is continuing to test until the lower or D-3 zone is found and tested. The only thing wrong with D-2 zone Devonian production in this area so far is that it is usually overshadowed by the tremendous D-3 results. Otherwise D-2 production is plenty good.

The southwest corner of the area is represented by Imperial 1 Schoepp, LSD 9, 22-51-27w4, which so far has found Devonian D-3 zone oil saturation 44 ft. thick above the water line, and is still looking for the water line. This well has 7-in. pipe set at 5,363 ft., and on drill-stem tests has found oil at least as far down as 5,407 ft. The Schoepp is either a new field, or a 4-mile west extension of the Woodbend area: (north end of Leduc-Woodbend field). If it is a new field, anything can happen. If it is a 4-mile west extension, it opens a lot of proven acreage.

The southeast well is Superior Oil Co. et al 1 Joseph Lake, LSD 11, 22-50-22w4, about 12 miles east of Leduc field, which is coring and drilling ahead to test deeper zones, after drill-stem tests indicated a probable producer in Upper Cretaceous sand. A drill-stem test at 3,269-76 ft. recovered 270 ft. of oil, and showed a bottom-hole flowing pressure of 650 psi.

Any one of these wells can lead to a lot of speculation about significance. Does the Stanolind well indicate that at a certain critical zone of Madison thickness production possibilities are good? The Madison tapers from maximum thickness in the trough in front of the mountains to a complete pinch-out before getting as far east as Leduc or Redwater.

Does the Schoepp well merely indicate a large extension to Woodbend, an important event in itself? Or is it the discovery well of a separate, but comparatively nearby pool? If a separate pool, just what happens in that area? A series of pools, and if so, in what line of trend?

As you go north and get closer and closer to the Athabaska oil sands, no one is ever quite sure what a Cretaceous sand discovery may mean; so you can speculate plenty about the Joseph Lake well.

The Bon Accord strike, purely on surface geography, might tempt one to think of a northeast-southwest trend from Leduc to Redwater. But geologically this would be a trend updip in the Alberta trough; whereas one would be more inclined to expect trends to line up along the strike of the through, instead of across the dip. But we know so little about reefs. After all, that is why the exploration societies are having a symposium on reefs at St. Louis this month: to try to learn something about them.

### HIGHLIGHTS OF WEEK'S DEVELOPMENTS

**WEST TEXAS.**—Week's highlight was Magnolia's 1-A TXL, Upton County strike, which started production tests of the Ellenburger. Late report indicated an increase in flow after an injection of regular acid. The well is West Texas' deepest producer. Unofficial word on Sinclair's Roberts County (Panhandle) wildcat again reported a recovery of 5,500 ft. of 45°-gravity oil, this time in the Mississippian around 9,000 ft. The well is the 1 Charles S. Lips, 135-C-G&M Survey. Stanolind and Danciger 1 Miller, Regan County discovery, recovered 163 bbl. of oil, swabbing and flowing; an increase over earlier tests. The Texas Co. 1 Scharbauer, Midland County Ellenburger exploratory test, gave up that formation and plugged back to the Pennsylvanian. It flowed a net of 62½ bbl. of oil from new perforations at 10,520-635 ft.

**ROCKY MOUNTAIN AREA.**—Tensleep saturation was found by Phillips Petroleum Co. at the first deep test at Golden Eagle, Hot Springs County, Wyoming. The operator is running casing to the top of the sand and will core the Tensleep prior to decision as to completing the well. J. B. Stoddard and Colorado Fuel & Iron are drilling below 7,010 ft., at the Bob Creek, Colorado, wildcat. Stanolind is now in the Amsden at the first deep test in the Beaver Creek field, Fremont County, Wyoming.

**SOUTH LOUISIANA.**—Danciger Oil & Refining Co. 1 Smiley, rank wildcat in Livingston Parish, flowed 100 bbl. of oil on a 12-hour test of perforations at an 8,005-ft. level. The well, located in 9-7s-5e, is more than 15 miles northeast of any other production in the state.

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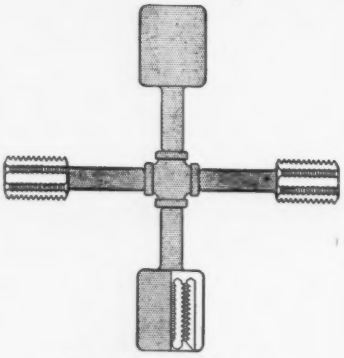
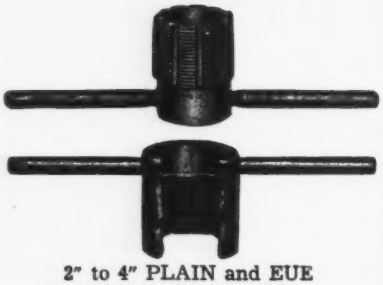


⅝" — ¾" — ⅞" — 1"

CLEANOUT TAP and DIES for TUBING



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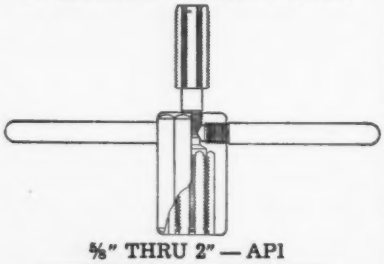

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# N. CENTRAL TEXAS

## Clay County May Get New Strawn Field

WICHITA FALLS.—Clay County had a new Strawn field in prospect, 1½ miles west of Joy Strawn pool, but separated from that area by dry holes, at L. T. Burns 1 Fulgham, on the line between Blocks 44 and 55, T. J. Belcher Survey. A 90-minute drill-stem test from 4,848-4,509 ft. brought gas to the surface in 19 minutes and recovered 1,110 ft. of clean oil and 270 ft. of heavily oil-cut mud. There was no water. Open flowing pressures were 300 psi. at the top and 1,800 psi. on bottom. Operators set casing to 4,474 ft. for completion.

Southeast of Deer Creek, Strawn production was indicated at A. R. Dillard and Waltermier 1 Holt, Block 4, J. H. Belcher Survey. After logging a showing of oil in sand from 4,493-98 ft., a 1-hour drill-stem test at 4,492-4,502 ft., total depth, brought gas to the surface in 20 minutes and recovered 100 ft. of free oil, plus 110 ft. of oil-cut mud. Bottom-hole pressure was 1,675 psi. in 15 minutes. Operators deepened to 4,550 ft., then ran a 30-minute test from 4,544-50 ft., recovering 20 ft. of slightly oil-cut mud.

In western Clay County, Gulf Oil Corp. 1-D Scaling, Block 19, HT&B Survey, south offset to the company's Caddo discovery of Lazy B field, had a slight show of oil in Strawn sand from 4,547-58 ft. It continued drilling below 4,598 ft.

Jack County explorations have increased over the past few weeks. Mid-Continent Petroleum Corp. 1 Killen, B. Lewis Survey, 3 miles southwest of Post Oak, was swabbing oil and water from perforations in Strawn sand from 3,792-95 ft. Operators planned to squeeze perforations. The well had shown some water on a drill-stem test of the sand but had made a flow of oil while pulling drill pipe. Three miles southwest of Jacksboro, Warren Oil Corp. 1 Tilghman, Block 4, Navarro CSL Survey, was drilling below 5,116 ft. in shale and hard sand. Wilcox Oil Co. and J. L. Woods Drilling Co. 1-G Voyles, 2 miles south of Antelope, BBB&C Survey, prepared to run a drill-stem test in the Caddo lime at 4,737-56 ft.

In Wise County, R. B. Thrift 1 W. O. Blocker, W. A. Gorman Survey, 2 miles southwest of the West Chico field, ran a 90-minute drill-stem test in conglomerate at 5,491-5,505 ft. Gas came to the surface in 5 minutes and the recovery was 5,000 ft. of oil. Bottom-hole flowing pressure was 500 psi. and 1,600 psi. after shut in 15 minutes. Approximately 1 mile south of the 1 Blocker, Thrift 1 Lawrence, J. B. Patterson Survey, perforated casing at intervals from 5,337-5,404 ft. and prepared to test. Cities Service Oil Co. 1 McKissick, 3 miles southwest of Decatur, had top of the Marble Falls at 6,742 ft. and was shut down for repairs at 6,880 ft. Five miles northwest of Alvord, Oil Well Drilling Co. 1 J. J. Patton, H. M. Cassidy Survey, topped the Caddo at 5,546 ft. and was drilling ahead at 5,700 ft. in conglomerate. South of Paradise, Mid-Continent Petroleum Corp. 1 M. S. McBride was below 6,154 ft. in shale. Bridwell Oil Co. 2 J. W. Berry, J. H. Hancock Survey, between the Chico and West Chico areas, acidized with 500 gal. at 5,246-74 ft., tested 2,000,000 cu. ft. of gas and was shut in.

In Throckmorton County, 12 miles south of Throckmorton, Wichita River Oil Co. 1-D Walker-Buckler, 1,650 ft. from north and 1,770 ft. from west lines, Block 1190, TE&L Survey, was drilling below 2,500 ft. on a 5,000-ft. contract. Location is ¾ mile south of Fred M. Manning, Inc., 1-B Brown, which was dry in the Mississippian at 4,860 ft. Cities Service and Sinclair 1 SMS Ranch, Block 100, BBB&C Survey, 12 miles northwest of Throckmorton, was drilling below 5,600 ft. in an unidentified formation, with top of the Mississippian reported at 5,264 ft.

**NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCAT**

Stephens County Texas Pacific Coal & Oil Co. 1 S. L. Harris, Sec. 17, T&P Sur., 10 mi. SE Breckenridge, flowed 193.8 bbl. 41°-gravity oil a day, ¾-in. choke, Marble Falls 3,880-96 ft., TD 4,138 ft., PB 3,919 ft., CP 1,300 psi., TP 75 psi., GOR 1,200 cu. ft.

**NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES**

Archer County: Hassie Hunt 2 Clemmie Wells, H. A. Hassell Sur., 2½ mi. E Archer City, dry, TD 3,770 ft.

Louis Sikes 1 F. Pruitt, Wm. Shaw Sur., A-378, 5 mi. E Holliday, dry, TD 4,506 ft.

Brown County: J. E. Fitzpatrick 1 W. I. Pittman, T&NO Sur., 7 mi. SW Brownwood, dry, TD 700 ft.

Clay County: T. E. Berry 1 E. L. Person, Sol Johnson Sur. A-272, 2 mi. SW Charlie, dry, TD 1,980 ft. in shale.

Comanche County: McClung & Greene 1 R. A. Adams, Sec. 5, Blk. E, H&TC Sur., 1½ mi. SW Dotham, dry, TD 535 ft.

Fisher County: S. B. Roberts and Eastland Oil Co. 1 C. R. Crowley, Sec. 4, W. E. Richardson Sur., 3 mi. NW McCauley, dry, TD 3,225 ft., Flippen lime 3,200 ft.

Jones County: Clark & Cowden Drilling Corp. 1 B. F. Jones, Sec. 14, Blk. 2, SPRR Sur., 7 mi. SW Anson, dry, TD 3,925 ft., Dotham 1,946 ft., base Saddle Creek 2,290 ft., top Coal 2,313 ft., Palo Pinto 3,894 ft., elev. 1,774 ft.

Humble Oil & Refining Co. 1 A. R. McBay, James Fenner Sur., 8½ mi. W Anson, dry, TD 3,971 ft., Noodle Creek 2,315 ft., Tannehill sand 2,363 ft.

Shackelford County: Deep Rock Oil Corp. 1 Elmer Scott Dawson, Sec. 194, ETRR Sur., 5 mi. SE Leuders, dry, TD 1,525 ft., Bluff Creek 1,468 ft., sand with light oil show 1,468-72 ft., Flippen lime 1,513 ft., elev. 1,550 ft.

Twin Oil Corp. 1 L. A. Sanders "A," Sec. 594, TE&L Sur., 5½ mi. NE Albany, dry, TD 4,750 ft., Caddo 3,934 ft., Mississippi 4,544 ft., Ellenburger 4,702 ft., elev. 1,331 ft.

Taylor County: Robinson-Puckett, Inc., 1 J. W. Harris, J. Griffin Sur., 5½ mi. E Tuscola, dry, TD 5,086 ft., Valera 710 ft., Sedwick 1,490 ft., Dotham 1,620 ft., coal 2,010 ft., Palo Pinto 3,374 ft., Strawn 3,500 ft., gray sand 4,172 ft., no shows, elev. 2,042 ft.

Wise County: J. M. Hickey & Sons 1 J. M. Hickey, Blk. 83, Van Zandt CSL, 3 mi. N Boyd, dry, TD 5,200 ft., no tops reported.

J. M. Hickey and Texzoma Oil Co. 1 Birdwell, B. Jones Sur., 4 mi. SW Boyd, dry, TD 6,010 ft., Caddo 3,800 ft., conglomerate 5,134 ft., sand with gas show 5,550-5,630 ft.

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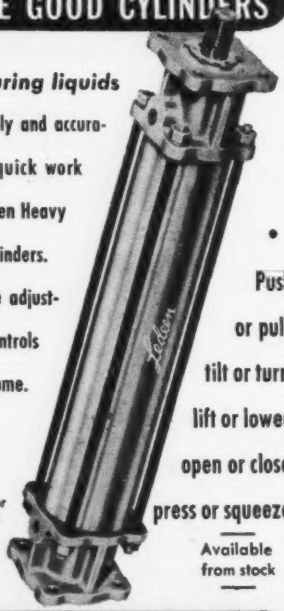

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# OKLAHOMA

## Garvin County Well Is Deese Producer

THE Garvin County outpost, Max Pray, Fred Morgan, and Elisha Walker, Jr., 1 Pratt, NE NE SE 20-4n-3w, is reported to be swabbing 14 bbl. per hour. Production is from perforations opposite the Deese at 7,280-7,305 ft. The hole was carried to 10,208 ft. in the Bromide and plugged back to 7,350 ft.

The offset to the discovery well of Union Point pool, Norman Smith et al 1 Neighbors, SW SW NE 21-10n-2e, Pottawatomie County, made 30 bbl. of oil in the first hour after plug was drilled. Choke was ¾ in. The well later averaged 16½ bbl. per hour through ¼-in. choke. Production is from the Wilcox with casing set at 5,960 ft. Total depth is 5,973 ft.

The northeast diagonal offset to the discovery well of Happy Valley pool is flowing at the rate of 200 bbl. per day through 20/64-in. choke. The well, Blackwell Oil & Gas Co. 1 Haskins, SW SW NE 25-17n-5e, Lincoln County, topped the Bartlesville at 3,409 ft. and was drilled to 3,426 ft. with casing set at 3,426 ft. Other wells are drilling to the north and east of the discovery well and a test ½ mile to the north has been staked at Wood Oil Co. 1 Haskins, SW SW SE 24-17n-5e.

Superior Oil Co. is drilling at 8,565 ft. at 48-16 Kremke, SE SE SW 16-17n-7w, Kingfisher County, ½ mile west of the discovery well of Southwest Dover pool. No information has been released other than depths but local reports indicate that some drill-stem tests have been taken. The discovery well, Superior 1 Long, was completed in December as a distillate well producing from pay at 8,565-8,640 ft.

Wilcox Oil Co. and W. W. Wolfe 1 McKee, SE SW NW 20-28n-1w, Kay County wildcat, had gas and a slight show of oil on drill-stem test. The well topped the Layton at 2,806 ft. and the 1-hour test at 2,808-37 ft. had gas in 26 minutes and recovered gas-cut mud with a light scum of oil. The gas flow was at the rate of 10,000 cu. ft. per day.

Testing has started at Shell Oil Co. 1 Kelly, C NE SW 23-10n-21w, Beckham County. Casing was perforated with 200 holes at 10,130-80 ft. and with packer set at 10,087 ft., the well had gas in 20 minutes and fluid in 3 hours. After flowing to pits for 1 hour, the well was turned to tanks and made 130 bbl. in 6 hours through ⅝-in. choke.

### OKLAHOMA SUCCESSFUL WILDCAT

Lincoln County: New pay in Davenport—Simmons 1 Oliver, SW NW SW 12-14n-5e, gaged 2,000,000 cu. ft. of gas per day from Prue at 3,266-70 ft., TD 3,382 ft.

### OKLAHOMA WILDCAT FAILURES

Cotton County: Jenkins 1 Turner, SE SE SE 34-3s-10w, dry, TD 1,810 ft., broken sand 1,324-48 ft. and 1,550-72 ft., sand 1,704-14 ft., broken sand 1,730-54 ft. and 1,760-76 ft., tight sand 1,798-1,804 ft., all water.

Creek County: Mid-Continent 1 Hammond, SE NW NW 8-14n-9e, dry, TD 3,815 ft., no tops reported.

Hughes County: Howell 1 Biddle, NW NW SE 20-9n-12e, dry, TD 3,360 ft. in second Cromwell.

Jefferson County: Youngblood 1 Bennett, SE NE NE 13-4s-6w, dry, TD 5,537 ft. in conglomerate.

Kiowa County: Stanolind 1 Chappelear, SW SW NE 8-7n-15w, dry, TD 6,696 ft., granite wash 1,140 ft., basal Pontotoc and Woodford 1,890 ft., Bois d'Arc 3,005 ft., Chimney Hill 4,965 ft., Sylvan 5,425 ft., Sylvan dolomite 5,670 ft., Viola 5,878 ft., Trenton Viola 6,010 ft.

Lincoln County: Woods Drilling 1 Moore, NE NE NE 12-16n-3e, dry, TD 4,333 ft., Hogshooter 2,870 ft., Layton 2,923 ft., Checkerboard 3,174 ft., conglomerate 3,188 ft., Oswego 3,700 ft., Verdigris 3,860 ft., Skinner 3,902 ft., lower Skinner 3,985 ft., lime 4,006 ft., Bartlesville 4,024 ft., Bartlesville sand 4,086 ft., lime 4,229 ft., Mississippi lime 4,292 ft.

Van Patten 1 Hert, NW SE NW 26-17n-3e, dry, TD 4,062 ft., Hogshooter 2,855 ft., Layton 2,908 ft., Checkerboard 3,134 ft., conglomerate 3,154 ft., Oswego 3,628 ft., Prue sand 3,770 ft., Verdigris 3,790 ft., Skinner 3,818 ft., lime 3,862 ft., Red Fork 3,908 ft., Inola 3,942 ft., upper Bartlesville 3,980 ft., lower Bartlesville 4,010 ft.

Logan County: Zephyr 1 Weiss, SW SW SE 3-16n-3w, dry, TD 6,346 ft., Layton 4,762 ft., Hogshooter 4,848 ft., Checkerboard 5,004 ft., conglomerate 5,017 ft., Big lime-Oswego 5,334 ft., Oswego 5,359 ft., Bartlesville 5,616 ft., Mississippi lime 5,678 ft., Woodford 5,828 ft., Hunton 5,915 ft., Sylvan 5,945 ft., Viola 6,050 ft., Wilcox 6,210 ft., second Wilcox 6,326 ft.

Major County: Olsen 1 Miers, C SW SW 3-21n-9w, dry, TD 8,150 ft., Ft. Riley 2,525 ft., Foraker 3,154 ft., Oread 4,415 ft., Tonkawa 4,680 ft., Avant 4,850 ft., Dewey 4,893 ft., Perry gas sand 5,018 ft., upper Layton 5,223 ft., lower Layton 5,700 ft., Morrow 6,710 ft., Mississippi lime 7,003 ft., Kinderhook 7,574 ft., Chattanooga 7,630 ft., Sylvan 7,690 ft., Viola 7,805 ft., dense 7,855 ft., Wilcox 7,948 ft., second Wilcox 8,018 ft.

Marshall County: Potter 1 Wright, SE NE NE 10-5s-5e, dry, TD 910 ft., sand 605 ft.

Osage County: Murta 1 Osage, NE NE SE 4-21-8e, dry, TD 2,380 ft., Big lime 1,955-2,003 ft., Prue 2,280-89 ft., shale 2,289-2,380 ft.

Marjo 1 Osage, SE SE SE 29-27n-7e, dry,

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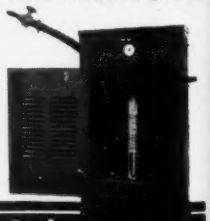

Paddock Sales of Texas
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TD 3,287 ft., Big lime 2,426-98 ft., Oswego 2,569-2,642 ft., lime 2,730-35 ft., Mississippi chat 2,878-2,926 ft., Mississippi lime 2,926-3,052 ft.

Tillman County: Richey 1 Cassidy, NW NE NE 3-5s-16w, dry, TD 2,120 ft., no tops reported.

# KANSAS

## Barton County Gets Pool Opener

BARTON County has what appears to be a pool opener at B & R Drilling Co. and Wilcox Oil Co. 1 Kuhlman, NW SW SW 12-19s-15w, about 1 mile south of Merten pool. The well topped the Arbuckle at 3,521 ft. and casing was set at 3,566 ft. Casing was perforated for tests of the Lansing-Kansas City but failed to find production. The hole was drilled out to 3,568 ft. and on swab test, the well made 94 bbl. of oil in 2 hours.

J. P. Gaty has another prospective pool opener near the western edge of Butler County at 1 DeMoss, NW SW SW 7-26s-3e. The well topped the Mississippian at 2,815 ft. and was drilled to 2,865 ft. Casing was set to 2,725 ft. The well had a hole full of oil and flowed but was shut in for tanks with no gage reported.

Near the western edge of Sedgwick County, J. M. Huber Corp. and Pabco Drilling Co. 1 Berk, SW SE NE 30-27s-4w, flowed 184 bbl. of oil in 7 hours through 1-in. choke. Production is from the Mississippian, called at 3,708 ft. Casing was set to 3,723 ft. and hole bottomed at 3,750 ft. The well is northeast of Bartholomew gas pool.

On the east side of Trapp pool in Russell County, E. H. Adair 1-A Pfeister, SW SE NW 24-15s-13w, swabbed 60 bbl. per hour from perforations opposite the Lansing-Kansas City at 3,092-3,100 ft. The Lansing was cut at 3,036 ft. and well drilled to 3,331 ft., 25 ft. in the Arbuckle. Casing was set at 3,318 ft. and the well had a small showing in the Arbuckle but was plugged back to the Lansing-Kansas City. The well is about ½ mile east of production in the pool.

Another wildcat on the western side of Russell County has a showing in the Lansing-Kansas City. Jones, Shelburne, et al 1 Gorham, NW NW NW 21-13s-15w, topped the Lansing at 2,999 ft. and recovered 255 ft. of oil and mud from a 20-minute drill-stem test at 3,081-96 ft. Casing has been set on top of the Arbuckle at 3,264 ft. Slight shows were reported for the Arbuckle.

El Dorado Refining Co. et al 1 Meistrell, NW NE SW 3-11s-18w, Ellis County, is proving for an extension of Northwest Burnett pool. The well topped the Arbuckle at 3,531 ft. and recovered 20 ft. of oil and 70 ft. of oil-cut mud on a 30-minute drill-stem test of the top 5 ft. of the formation. Casing has been set to 3,532 ft.

### KANSAS WILDCAT FAILURES

Barton County: Aledo Oil Co. 1 Wood, NE NE NE 22-19s-13w, dry, TD 3,459 ft., Heebner 3,065 ft., Kansas City 3,182 ft., Arbuckle 3,417 ft.

Ellis County: Petroleum, Inc., 1 Ryan, SE SE NW 6-15s-18w, dry, TD 3,633 ft., anhydrite 1,215 ft., Heebner 3,259 ft., Lansing 3,303 ft., conglomerate 3,589 ft., Arbuckle 3,620 ft.

Brunson Drilling Co. 1 Wann-Harwood, NW NW NW 21-12s-19w, dry, TD 3,885 ft., anhydrite 1,540 ft., Heebner 3,450 ft., Toronto 3,470 ft., Lansing 3,490 ft., conglomerate 3,835 ft., Arbuckle 3,855 ft.

Harper County: Deardorf Petroleum Co. 1 Washbon et al, SW SW NE 15-32s-7w, dry, TD 5,080 ft., Kansas City 3,860 ft., Mississippian 4,419 ft., Kinderhook 4,680 ft., Simpson dolomite 4,789 ft., Simpson sand 4,825 ft., Arbuckle 4,942 ft.

Marion County: Hutchinson Oil & Gas Co. 2 Ptacek, SE SE SW 20-19s-4e, dry, TD 2,655 ft., Mississippian 2,335 ft., Viola 2,616 ft.

Rice County: Lewis Drilling Co. 1 Guldner, NW NW SW 17-18s-9w, dry, TD 3,288 ft., Heebner 2,769 ft., Dodge 2,807 ft., lime 2,890 ft., Lansing 2,914 ft., basal Kansas City 3,200 ft., conglomerate 3,252 ft., Arbuckle 3,262 ft.

Rooks County: National Cooperative Refinery Assoc. 1 Hilgers, SW NW NW 30-9s-18w, dry, TD 3,652 ft., Topeka 3,139 ft., Heebner 3,332 ft., Lansing 3,374 ft., Arbuckle 3,614 ft.

Stafford County: Raymond & Lebow Drilling Co. 1 Toland, SE SE SW 32-25s-13w, dry, TD 4,455 ft., Heebner 3,587 ft., Toronto 3,603 ft., lime 3,745 ft., Lansing 3,763 ft., conglomerate 4,192 ft., Viola 4,281 ft., Simpson 4,325 ft., Arbuckle 4,419 ft.

# APPALACHIAN FIELD

## Wood County Wildcat Tests Oriskany Gas

PITTSBURGH.—In Steele district, Wood County, West Virginia, two wildcat tests have reached important stages of drilling. Godfrey L. Cabot, Inc., 1-1282 Jacob Gates, elevation 1,035 ft., Corniferous lime 5,119 ft., reported the Oriskany sand at 5,225 ft. and gas testing 395,000 cu. ft. at 5,226 ft. United Carbon Co. et al 2-1582 Godfrey L. Cabot, Inc., Kerr Tract, elevation 733 ft., logged the Corniferous lime at 4,695 ft. and ran 7-in. casing at a depth of 4,705 ft. In Lincoln district, Wayne County, United


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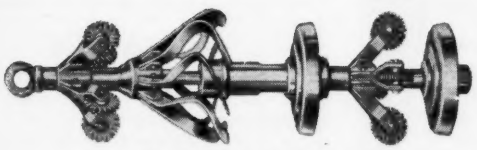

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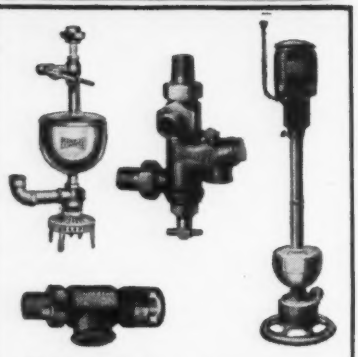

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Fuel Gas Co. 42-6181 F. D. Caldwell, deep test, elevation 688 ft., reported a show of gas at 7,570 ft. gaging 30,000 cu. ft., and drilling has reached the depth of 7,577 ft. In Browns Creek district, McDowell County, Godfrey L. Cabot, Inc., 24-1292 Pocahontas Land Co. was brought in for 1,329,000 cu. ft. of gas in the Weir sand, total depth 3,621 ft. In Baileysville district, Wyoming County, United Producing Co. 73-1548 W. M. Ritter Lumber Co. tested 1,565,000 cu. ft. of gas in the Berea sand, total depth 3,400 ft.

In Napier Township, Bedford County, Pennsylvania, South Penn et al, Snee & Eberly's wildcat, the 1 Jesse B. Miller, elevation 1,666 ft., is drilling at 2,892 ft. In Derry Township, Westmoreland County, Peoples Natural Gas Co. 4-3814 Camilla Giffin, elevation 2,238 ft., has reached 8,231 ft., and in Unity Township this company's 1-3830 William Piper, elevation 2,061 ft., is at 6,786 ft.

## SOUTHWEST TEXAS

### Discoveries Highlight Active Week

CORPUS CHRISTI.—New gas sand discovery in the Quien Sabe field, Webb County, O. W. Killam 20 Bruni gaged 5,000,000 cu. ft. of gas per day from the Holbein sand with perforations at 2,670-75 ft. Pressures on the test were 400 psi. on tubing, 700 psi. on the casing, and shut-in pressure was 820 psi. Total depth is 3,723 ft.

Chicago Corp. 1 Rand Morgan, discovery well of new 7,200-ft. production on the southeast flank of the Saxet field, Nueces County, flowed 6 bbl. of oil per hour on initial test through ¼-in. chokes, making 30°-gravity pipe-line oil, under 150 psi. working pressure, through perforations at 7,224-27 ft. Total depth is 10,799 ft. with 7-in. casing set to 8,893 ft. This well is in Section 6 of the J. R. Ward Survey.

An extension well in the Bigfoot area of northeastern Frio County, Miller Royalty Co. et al 1 C. R. Thompson is being put on the pump for completion, after swabbing 3 bbl. of pipe-line oil per hour from open hole at 3,282-98 ft. in the Navarro sand zone. This well is in the F. Boyer Survey 142, approximately 5 miles south of Bigfoot.

Continental Oil Co. 1 McKnight, wildcat 3 miles southwest of Carrizo Springs, in Dimmit County, swabbed oil and mud from new perforations at 2,689-2,702 ft. in the 2,700-ft. sand, then acidized, and is testing for production. On a previous test through perforations at 3,023-033 ft. the well showed a little salt water, and at 3,009-10 ft. tested dry. Total depth is 3,333 ft. The best test prior to setting casing was at 2,561-74 ft. where drill-stem test, open 30 minutes, developed 13½ psi. working pressure through ¼-in. chokes, and recovered 160 ft. of oil and 120 ft. of oil-cut mud. This well is in the M. M. Battles Survey 11½.

Amerada Petroleum Co. 1 Zamora, wildcat test in Brooks County, 3 miles northeast of Falfurrias, on a 23-minute drill-stem test at 7,352-60 ft. developed 815 psi. working pressure through ¼-in. chokes, and recovered 90 ft. of oil and 60 ft. of salt water, bottom-hole pressures 2,675 psi. open and 3,425 closed. Operators set 5½-in. production casing to 7,510 ft. and will perforate for test above the 7,500-ft. depth. Total depth is 8,610 ft. This well is located in the Loma Blanca Grant.

**SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS**

Aransas County: New oil pay, Fulton Beach—Stanolind Oil & Gas Co. 1 State Tract 82, Aransas Bay, 330 ft. NW of shoreline of Live Oak Peninsula, TD 7,522 ft., top pay 7,045 ft., perf. 7,052-58 ft., IP 45 bbl. oil per day through ⅛-in. choke, GOR 12,440, TP 2,150 psi., casing sealed, gravity 44°.

San Patricio County: New oil pay, East Plymouth—F. M. Boykin, Jr., 1 W. P. Mullen, Block 1, Section 27, ¼ mi. SE of East Plymouth gas field (old well drilled deeper, formerly Texon Royalty 1 Mullen dry hole, TD 4,955 ft.), TD 5,525 ft., top pay 5,481 ft., perf. 5,481-91 ft., IP 123 bbl. oil per day through ⅛-in. choke, GOR 325, TP 1,000 psi., casing sealed, gravity 28.5°.

**SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES**

Atascosa County: J. C. Wynne et al 1 Walker W. Williams, Sur. 6, 4 mi. N of Poteet, dry, TD 3,552 ft.

Duval County: H. R. Smith and Seaboard Oil Co. of Delaware 1 Jose Rangel, Sur


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329, 13 mi. NW of San Diego, dry, TD 4,403 ft.

Guadalupe County: B. B. Oil Co. 1 Koepel Drilling Block, Moses Baker Sur., 2½ mi. W of McQueeny, dry, TD 1,329 ft.

Wiegand Bros. 1 J. M. Pearman, Robert Hall Sur., 6 mi. NE of Kingsbury, dry, TD 2,184 ft.

Jim Hogg County: Amerada Petroleum Co. 1 Thomas M. de Garcia, Sur. 95, 10 mi. SW of Hebbronville, dry, TD 3,504 ft.

Amerada Petroleum Co. 2 A. A. Martinez, Sur. 293, 10 mi. SW of Hebbronville, dry, TD 3,505 ft.

M. L. Massingill 1 C. W. Hellen, Sec. 150, Duval County School Land Sur., 6 mi. W NW of Hebbronville, dry, TD 3,307 ft.

McMullen County: Ray Clark & Joe Stelzig 1 Delmar Pugh et al, E. L. Garrett Sur. 93, 25 mi. NW of Freer, 1 mi. N of SW corner of McMullen County, dry, TD 1,804 ft.

Milam County: High Point Oil Co. and W. C. Hall 1 Elmo W. Baurschlag, O. D. Graham, Trustee, Justo Liendo Sur., 2 mi. SE of Thorndale, dry, TD 1,698 ft.

Starr County: A. & T. Drilling Co. B-2 P. S. de Renaga, Sur. 72, 25 mi. N of Roma, dry, TD 1,200 ft.

W. H. Holland & Ernest Adams B-1 Vela, Porcion 91, Share 2-A, 12 mi. NE of Rio Grande City, dry, TD 3,540 ft.

Uvalde County: O. Wolters 1 Kirchgraber, GC&SF Sur. 533, 15 mi. W of Uvalde, dry, TD 930 ft.

Webb County: H. M. Amsler, Trustee, et al and The Texas Co. 1 A. M. Bruni Estate, et al, in Sur. 1571, 2 mi. SW of Rieser, dry, TD 7,020 ft.

## TEXAS GULF COAST

### Humble Finds Condensate In Goliad County Test

HOUSTON.—A new gas-condensate pool has been opened in northwestern Goliad County by Humble Oil & Refining Co. 1 B. T. Powell, approximately 1 mile north of Hord's Creek field and 3½ miles southwest of Charco townsite. Drilled to a total depth of 9,005 ft., with 7-in. casing set to 7,443 ft., this well gaged 4,400,000 cu. ft. of gas and 57 bbl. of condensate per day through ¼-in. chokes from perforations at 7,655-65 ft. Tubing pressure was 2,375 psi. Gas-condensate production also was indicated at 7,384-7,410 ft. and 7,554-63 ft.

Dirks Bros. and Tide Water Associated Oil Co. C-2 C. A. Dugat, a wildcat 1 mile west of the Dirks field, has been completed as a gas-condensate producer from the Wilcox zone, Bee County. Total depth is 7,557 ft., with 5½-in. casing set in the Wilcox and perforated for completion of an estimated 3,500,000 cu. ft. of gas with 100 bbl. condensate per day. A drill-stem test made in the Luling sand at 7,264-68 ft., prior to setting pipe, developed 215 psi. working pressure in 15 minutes, and recovered 658 ft. of oil with 282 ft. of salt water, through ¼-in. chokes. Another test at 7,430-39 ft. in the Mackhank zone recovered 30 ft. of condensate and 15 ft. of wash water in 9 minutes, with 9 psi. working pressure, using ¼-in. chokes.

Placid Oil Co. opened a new oil field in eastern Goliad County, approximately 2 miles southeast of Fannin and 2¼ miles north of the Fannin gas field, with the 1 Robbie N. Wells, which flowed 5 bbl. hourly through a ⅛-in. choke through perforations at 3,721-29 ft. Total depth is 4,815 ft. with 5½-in. casing set to 3,740 ft. This well is located in Juan Rener Survey.

Warren Oil Corp. 1 McCurdy-Moss, wildcat approximately 1 mile southwest of the South Blanconia field, in Bee County, has been completed for a gas producer from the 2,500-ft. level. It was drilled to a depth of 5,888 ft. The well flowed gas through a ⅛-in. choke, with 1,075 psi. tubing pressure and 1,100 psi. casing pressure through perforations at 2,518-25 ft.

Potential flow gage for Sun Oil Co. 1 State-Hannah Reef, a gas-condensate dis-


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covery in the Hannah Reef area of Galveston Bay, Galveston County, has been announced. This well is in State Tract 232, approximately 8 miles north of Port Bolivar, and 7 miles southeast of Red Fish Reef production. Total depth is 11,009 ft., and the flow was 215 bbl. of 52.8°-gravity condensate per day with a gas volume of 2,863,000 cu. ft. of gas daily. Flowing pressure on tubing while on the 12/64-in. choke was 3,015 psi. Gas-condensate ratio was 13,181. Shut-in pressure on tubing is 4,015 psi. Production is through perforations at 10,674-88 ft.

**TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS**

Galveston County: New gas-condensate discovery, Hannah Reef—Sun Oil Co. 1 State, Sec. 232, Galveston Bay, 8 mi. N of Port Bolivar, 7 mi. SE of Red Fish Reef production, TD 11,009 ft., top sand 10,674 ft., perf. 10,674-688 ft., IP 2,863,000 cu. ft. gas and 215 bbl. condensate per day through 12/64-in. choke, GOR 13,181, TP 3,015 psi., SIP 4,015 psi., gravity 52.8°.

Goliad County: New gas-condensate pool—Humble Oil & Refining Co. 1 G. T. Powell et al, W. D. Sutherland Sur., 3½ mi. SW of Charco townsite, 1 mi. N of Hord's Creek field, TD 9,005 ft., perf. 7,655-65 ft., IP 4,400,000 cu. ft. gas through ¼-in. choke, with 57 bbl. condensate per day, TP 2,375 psi.

Tyler County: New oil sand, East Hillister field—Humble Oil & Refining Co. 2 Wm. Rice Institute, Arthur Hutchins A-846, TD 9,538 ft., top sand 7,333 ft., perf. 7,342-50 ft., IP 72 bbl. oil per day, gravity 46.1°.

**TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES**

Brazoria County: Placid Oil Co. 1 W. C. Corbett et al, HT&B Sur., Sec. 9, dry, TD 9,638 ft.

Calhoun County: Pontiac Refining Corp. and Riddell 1 Athol Shofner, Florentine Garcia Sur., 5½ mi. SW of Port Lavaca, dry, TD 7,515 ft.

Goliad County: Taylor Refining Co. 1 Myrtle L. Patton, Maria Jesus de Leon Sur., 5¼ mi. W of Goliad, dry, TD 5,255 ft.

Orange County: Sun Oil Co. 1 E. W. Brown Estate, B. Garner Sur., 1 mi. E SE of Orange field, dry, TD 9,014 ft.

Wharton County: Perry R. Bass et al 1 H. C. Cockburn et al, S. A. Larche Sur., 2 mi. SW of Magnet townsite, dry, TD 7,758 ft.

Wilson County: Alaska Steamship Oil Co. et al 1 Teas, David I. Holt Sur., A-131, 6 mi. NE of Poth, dry, TD 1,363 ft.


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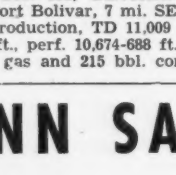

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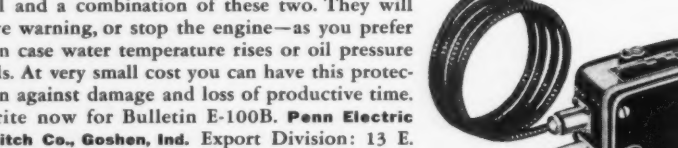

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# ROCKY MOUNTAIN

## Golden Eagle Deep Test Finds Tensleep Saturation

DENVER.—Saturation was encountered in the Tensleep at Phillips Petroleum Co.'s deep test on the Golden Eagle structure in the NW SE SW 12-45n-97w, Hot Springs County, Wyoming. Top of the Tensleep was found at 9,339 ft. and cores between 9,338-63 ft. showed saturated sand. The operator is now running casing and will core through the Tensleep formation prior to decision as to completing the well in the Tensleep or Embar formation. The well logged saturation in the Embar, and recovered 5,040 ft. of oil on drill-stem test in the upper section of that formation. The operation is a joint interest with Pioneer Oil Corp. of Denver holding one-half interest in the deep rights. Pioneer established production in the Muddy and Lakota formations on the structure. This field is 7 miles northwest of the Little Sand Draw field, where a discovery in Tensleep was recently completed by Seaboard Oil Co. and Husky Refining Co. of Cody.

The J. B. Stoddard-Colorado Fuel & Iron Corp. wildcat at 1 Wright, C SE NE 11-20s-58w, Bob Creek, Crowley County, Colorado, is now drilling below 7,010 ft. Although contract depth on the well was 7,000 ft., the operators have decided to carry the well another 300 or 400 ft. The well is believed to be in the Ordovician at present depth, although no formation tops have been relased on the operation. This is the first of two wildcats in this area on acreage assembled by Colorado Fuel & Iron. Gulf Oil Corp. is drilling a test at Tepee Buttes, 15 miles northeast of Bob Creek, at 1 Unit, SE SE NW 36-18s-56w, and this well is below 6,000 ft. Colorado Fuel & Iron did extensive gravity work in the area prior to the drilling.

Stanolind Oil & Gas Co. is now coring in the Amsden at the first deep test in the Beaver Creek field. The well is the 1 Unit, CN½ SE 10-33n-96w, Fremont County, Wyoming, and Amsden was topped at 10,894 ft. The well is now below 10,903 ft. This well found saturation in the Tensleep, and will go to the Madison prior to completion. Seven-inch casing was cemented at 10,447 ft. The Beaver Creek field produces gas from the Dakota sand, and has not previously been tested below the Sundance.

Development drilling in the Ashley Valley field, Uintah County, Utah, indicates that the field may be an extensive producer in the Weber formation. There are now four wells drilling in the field, with two commercial Weber sand producers. The Crane-Griffith 1 Uinta Basin, an extension ½ mile southeast, is now drilling below 3,700 ft., and is reported running approximately 150 ft. lower structurally. There has been considerable leasing reported in the Ashley Valley area in recent weeks, and other wildcats are now reported planned in the area.

In Wyoming, Parker and Simmons made location for a wildcat 3 miles southeast of the Skull Creek field in the 1 Wright, SW NE SW 24-44n-62w, Weston County. Florence Drilling Co. is rigging up for a wildcat in

the Buckhorn Creek area, Larimer County, Colorado.

**WYOMING WILDCAT FAILURES**

Park County: Big Sand Coulee: Stanolind Oil & Gas Co. 1 Unit, C SE NE 8-55n-100w, TD 13,447 ft., dry, Bearpaw 6,240 ft., Claggett 6,981 ft., Eagle 7,744 ft., Telegraph Creek 7,954 ft., Cody 8,191 ft., Frontier 9,906 ft., Mowry 10,395 ft., Dakota 11,353 ft., Morrison 11,464 ft., Sundance 11,838 ft., Chugwater 12,310 ft., Dinwoody 12,955 ft., Phosphoria 12,976 ft., Tensleep 13,059 ft., Amsden 13,199 ft., Madison 13,402 ft.

Teton County, Spread Creek: Stanolind Oil & Gas Co. 1 Unit, NE SE SW 25-44n-113w, TD 7,581 ft., dry, Frontier 3,108 ft., Mowry 3,800 ft., Dakota 5,099 ft., Fuson 5,230 ft., Morrison 5,545 ft., Sundance 5,806 ft., fault 6,400 ft.

Weston County, Stockade area: Parker & Simmons 1 Gov't., NW SW NE 5-43n-61w, TD 3,348 ft., dry, Wall Creek 1,933 ft., Newcastle 2,920 ft., Dakota 3,119 ft.

**MONTANA WILDCAT FAILURE**

Petroleum County, Box Elder: Amerada and British-American 1 Burke, TD 4,917 ft., dry, Colorado 365 ft., Kootenai 460 ft., Ellis 1,078 ft., Amsden 1,900 ft., Otter 2,278 ft., Kibbey 2,630 ft., Charles 2,890 ft., Madison 3,510 ft., Cambrian 4,745 ft.

# MISSISSIPPI

## Roxie Field Well Taps Deep Production

JACKSON. — In the Roxie field area, Franklin County, Vaughey & Vaughey-Big Chief 1 J. M. Seab, 12-6n-2e, is testing through perforations at 10,623-25 ft. opposite the upper sand stringer in the lower Tuscaloosa section. On a 20-hour gage using a 7/32-in. choke in the christmas tree and 10/64-in. choke at the heater, the well flowed 86.2 bbl. of 39.6°-gravity oil. Flowing pressure was 900 psi. and gas-oil ratio varied from 600 to 1,000. Two days later the well flowed 93 bbl. in 24 hours using the same chokes. Pressure, gravity, and gas-oil ratio were the same. The well is equipped for dual completion for flow from lower perforations at 10,703-705 ft. through tubing and upper perforations through casing. The shut-in pressure on the tubing has remained at 2,200 psi. Operators plan to flow lower perforations through tubing as soon as a treater is installed.

The California Co. 1 Cranfield Unit 7, Tract 47, 32-7n-1e, in Cranfield field, Franklin County, has been completed for an initial production of 350 bbl. of 38.8°-gravity oil per day, flowing through a 12/64-in. choke, tubing pressure 1,275 psi,, gas-oil ratio 1,412. Total depth is 10,319 ft.

In the East Heidelberg field, Jasper County, Gulf Refining Co. 2 Norman-Husband Unit, 30-1n-13e, was drilled to a total depth of 5,010 ft., and completed for a potential flow of 116 bbl. of 24.2°-gravity oil per day through an 11/64-in. choke.

Big Chief Drilling Co. 2 E. B. Ogden, 9-6n-2w, in La Grange field, Adams County, flowed 76 bbl. of oil, 43.3°-gravity, per day through a 3/16-in. choke, tubing pressure 80 psi. Total depth is 6,285 ft.

Kemp Drilling Co. 4 E. B. Ogden, 43-6n-2w, in South La Grange field, Adams County, flowed an initial production of 217 bbl. of 44.3°-gravity oil per day. Total depth is 6,420 ft. In the same field Vaughey & Vaughey 2 E. B. & Louise Ogden, 42-6n-2w, was completed for a potential of 160 bbl. per day through 9/64-in. choke, gravity 44.2°. Total depth is 6,484 ft.

**MISSISSIPPI WILDCAT FAILURES**

Hinds County: Shell Oil Co. 1 I. M. Beasley, NW NW 2-6n-1e, dry, TD 4,750 ft.

Pike County: Sells Petroleum Co. 1 Johnnie Williams, NW SE 4-4n-7e, dry, TD 11,148 ft. Top Wilcox 4,260 ft., Midway


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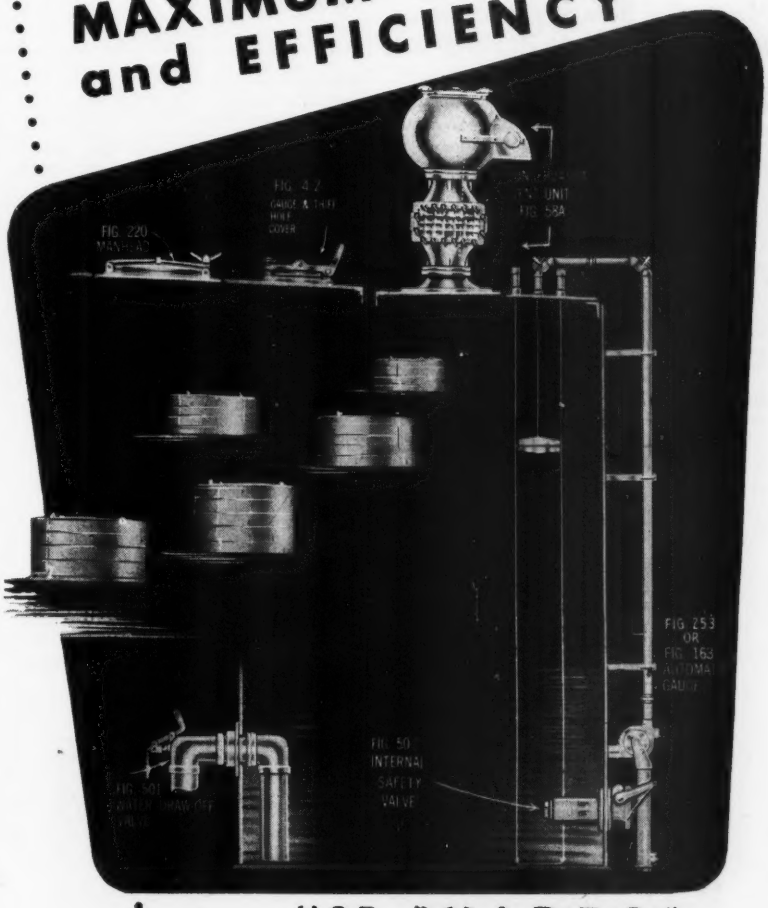


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## PERMIAN BASIN

### Magnolia Sets West Texas Producing Depth Record

MIDLAND.—Magnolia Petroleum Co. 1-A TXL, northern Upton County wildcat, was hailed as a definite Ellenburger discovery as first production tests were started from bottom of the indicated pay back up the hole. Two trips of the swab, after a light acid treatment, started the well flowing from perforations in the casing at 12,780-12,820 ft.

It was allowed to clean into pits for 30 minutes, then turned into tanks. The first hour of flow gaged 12.4 bbl. of 51.2°-gravity oil, with gas-oil ratio of 1,003 cu. ft. The following 17 hours it averaged 12.9 bbl. an hour, for a total of 219.35 bbl. Total for the 18-hour test was 231.75 bbl. of oil, with no water. The test was made through ¼-in. tubing choke. Flowing tubing pressure at the start of the test was 475 psi., increasing to a steady 1,215 psi. at the end.

The second flow test, and first full 24-hour gage, yielded 306.5 bbl. of 53.6°-gravity oil, plus 1 per cent drilling mud and acid water. Choke was ¼ in. Gas-oil ratio had increased slightly, to around 1,300 cu. ft., and flowing tubing pressure was around 1,300 psi.

Plans for further perforating had not been disclosed. Some time ago operators announced that tests would be made up the hole, through the entire section. The well has recovered oil on drill-stem tests from top of the formation at 12,530 ft., 9,640 ft. subsea, to 12,805 ft. Recovery of oil from 12,750-805 ft. was down considerably over other tests and no oil or gas were recovered below 12,805 ft. Total depth was 13,295 ft., plugged back to 12,825 ft.

Location of the discovery in the NW NW Section 31, Block 40, T&P Survey, is 10¼ miles from the Crane-Upton county line and ¼ mile south of the Midland County line. It is nearly 30 miles northwest of similar production in Benedum field. In 1947 Magnolia drilled a dry Permian test to 5,569 ft., as the 1 Roy E. Glass, in NE SE SE 30-40-T&P Survey, which is about ¾ mile northeast of the 1-A TXL. Magnolia 1 American Republics Corp. was drilled to 8,507 ft. and abandoned in January 1945. This test was in the NW NW 8-40-T&P Survey, and 4 miles south and about 1 mile east of the 1A TXL.

In Susan Creek (Strawn) field of Tom Green County, Plymouth Oil Co. 2 J. Wiley Green, southeast offset to the discovery and third well in the field, planned to core the entire Strawn section, then continue drilling to the Ellenburger which is expected around 5,500 ft. The 2 Green has already penetrated the Strawn section farther than the field's other two wells, and will be the first in the area to test the Ellenburger. The well, on an elevation of 2,153 ft., entered the Strawn at 4,755 ft., which was said to be about flat with the discovery. At last report, coring had progressed to 4,795 ft., with 38 ft. of pay indicated.

Scurry County's latest oil discovery was reported at Humble Oil & Refining Co. 1 Richard Bishop, SW SW 164-97-H&TC Survey, 13 miles southwest of Snyder. The well first flowed at the rate of 35 bbl. an hour during the last 26 minutes of an 80-minute drill-stem test of the Canyon limestone at 6,659-70 ft. The flow was through ⅝-in. choke. It was then drilled to 6,680 ft., and a 42-minute test made from 6,660-80 ft. Gas came to the surface in 4 minutes, and oil in 25 minutes, which flowed at an estimated rate of 50 bbl. an hour. Gas-oil ratio was estimated at 700 cu. ft. Open flowing bottom-hole pressure was 900 spi., increasing to 3,050 psi. when shut in 17 minutes. Operators were to run electrical surveys, then run casing to bottom and perforate for completion. The 1 Bishop is 3 miles south of Lion Oil Co. 2 McLaughlin, Canyon lime discovery, and 1 mile north of shallow Clear Fork production on the northwest end of the Sharon Ridge field.

Humble extended Canyon lime production 1½ miles west of the Dermott field at its 1 L. M. Perriman. NE SE 451-97-H&TC Survey. Producing from open hole between 7,050-70 ft., plugged back total depth, the well flowed 224.8 bbl. of oil in 23 hours. Size of choke was not reported. In the next 24 hours, the well flowed 240 bbl. of oil, through 11/32-in. choke. The producing horizon is from a lower level than wells to the east, but has been identified as the lower Canyon and not the Strawn.

North of the 1 Perriman, Lone Star Producing Co. 1 M. M. Maule, SE SE 451-97-H&TC Survey, swabbed 144 bbl. of fluid, estimated at 40 per cent oil and the balance water, in 24 hours from perforations at 7,064-80 ft. These holes were squeezed. Operators then perforated at 7,066-74 ft., ran tubing to 7,060 ft. and prepared to acidize.

Southeast of Dermott field, Placid Oil Co. 1 Cornelius Davis, NW SE 387-97-H&TC Survey, pumped 30 bbl. of water in 24 hours, with no oil. It is testing the Canyon lime through perforations at 6,725-32 ft.

Wilshire field of Upton County had prospects of a second producer at Wilshire Oil Co. 42-135 McElroy Ranch, SE NE 135-E-CCSD&RGNG Survey. The well was swabbing up to 20 bbl. of clean oil an hour through casing perforations from 7,700-7,825 ft., in the Wolfcamp, after acidizing with 7,500 gal. It was originally drilled as Standard Oil Co. of Texas 1 McElroy, to 7,193 ft. Recent operations deepened the hole to 9,563 ft. and set casing on bottom. Location is 2 miles northeast of the Wilshire discovery well, Wilshire 23-148 McElroy, completed last December. It is 1½ miles east and ½ mile north of Standard of Texas 22-148 McElroy. SE NW 148-E, same survey, which finished dry at 8,040 ft.

#### WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

Crane County: George F. Getty 2 Mollie Day, Sec. 3, Blk. X, CCSD&RGNG Sur., 2½ mi. S Crane, dry, TD 2,853 ft., pumped 11 bbl. oil, 5 bbl. water in 24 hr., perforations 2,775-2,840 ft.

Lamb County: DeKalb Agriculture Associated, Inc., 1 J. R. Jameson, Sec. 22, Blk. 674, Taylor CSL, 3½ mi. SW Littlefield, dry, TD 4,172 ft., San Andres 3,150 ft.

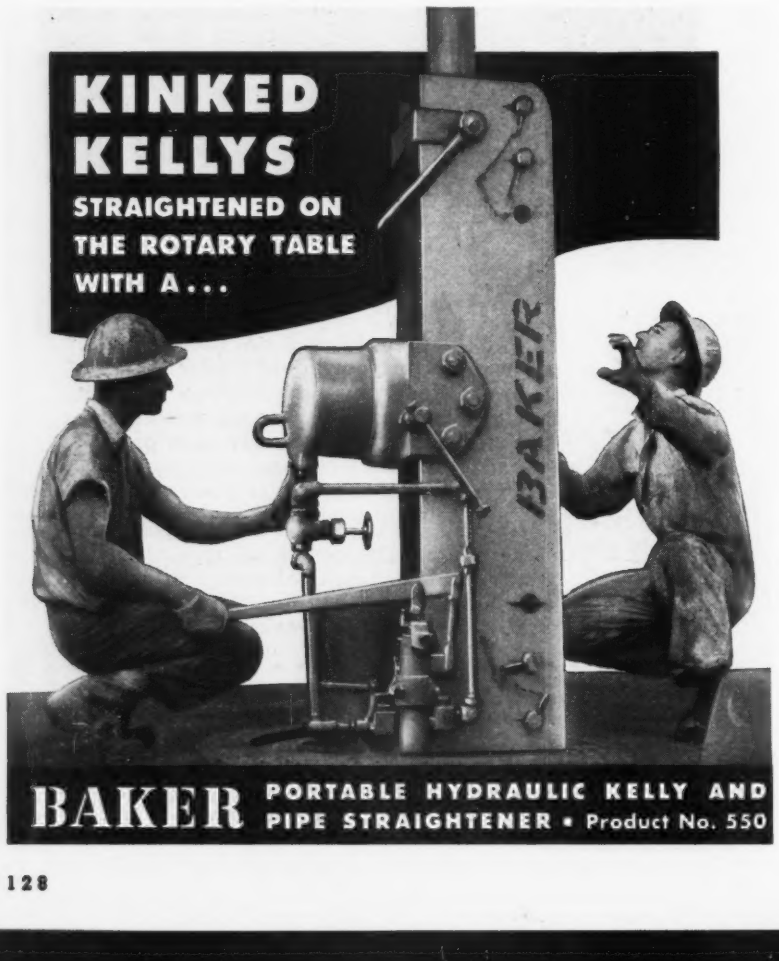
Pecos County: Magnolia Petroleum Co. 1-39 Eaton, Sec. 39, Blk. 3, H&TC Sur., 9 mi. W Imperial, dry, TD 9,526 ft., Devonian 5,880 ft., McKee 7,740 ft., Ellenburger 9,057 ft., elev. 2,454 ft.

#### SOUTHEASTERN NEW MEXICO

HOBBS.—Magnolia Petroleum Co. 1 Cox-Federal, 1-9s-36e, 4¼ miles northeast of the Crossroads field, was drilling ahead below 10,975 ft. in lime and shale. Magnolia 1 T. Betenbaugh, 12-9s-35e, 5½ miles northwest of the Crossroads discovery, was drilling in limes at 5,600 ft.

Mid-Continent Petroleum Corp. 1 Dessie Sawyer, northwest offset in 27-9s-36e, had total depth at 12,231 ft. in dolomite, drilled out to 12,180 ft., and was testing. After acid treatments of 500 and 1,500 gal., through perforations at 11,750-785 ft., the well flowed 133 bbl. of oil in 11 hours through ¾-in. choke. Operators then perforated at 11,785-840 ft. with 220 shots and were swabbing at the rate of 20 bbl. an hour.

Mid-Continent's 1-B U. D. Sawyer in 34-9s-36e, over which there has been some controversy as to whether it is in the Mis-

Mississippian or Devonian, prepared to run casing and test an oil show at 12,440 ft. Total depth was 12,750 ft. Operators cored black, silty lime at 12,681-686 ft. A 90-minute drill-stem test at 12,560-750 ft. recovered water blanket plus 930 ft. of sulfur water and 90 ft. of drilling mud, with no shows of oil.

Amerada Petroleum Corp. 1-C-A State, 9-10s-36e, was drilling below 9,350 ft. Amerada's 1-B-T-A State, 2-12s-33e, was below 8,310 ft. The same company's 1 J. R. Hamilton, 35-16s-38e, recovered fish and was drilling below 11,500 ft. in lime.

Eight miles north of Tatum, Humble Oil & Refining Co. 1-X State, 31-11s-35e, had drilling under way and was below 4,000 ft. It is scheduled to go to 12,000 ft.

Kewanee Oil Co. 36 Baish, deep test in the Maljamar San Andres field, in 28-17s-32e, was drilling Pennsylvanian shale at 10,727 ft. Phillips Petroleum Co. 1 Shipp, 20-18s-37e, was drilling below 10,215 ft. in lime.

Stanolind Oil & Gas Co. 1 South Mattix Unit, 15-24s-37e, on the north edge of the Langlie-Mattix shallow field, recovered 480 ft. of slightly gas-cut drilling mud on a drill-stem test at 7,249-7,321 ft., open 2 hours. A 1-hour test from 7,349-7,437 ft. recovered 210 ft. of slightly oil and gas-cut mud. It topped the Devonian at 7,280 ft.

**SOUTHEAST NEW MEXICO WILDCAT FAILURES**

Lea County: Amerada Petroleum Corp. 1 Stella Bennett Rose, SE NW 35-16s-38e, dry, TD 6,865 ft., anhydrite 2,067 ft., salt 2,170-3,043 ft., Yates 3,220 ft.

W. A. Hudson 1 Saunders, SE NE 26-20s-33e, dry, TD 3,244 ft., anhydrite 1,500 ft., Salt 3,100-3,210 ft.

## SOUTH LOUISIANA

### Rank Wildcat Opens New Area

NEW ORLEANS.—Danciger Oil & Refining Co. 1 Myrtle E. Smiley, discovery well in the Springville area of Livingston Parish, flowed on 12-hour test 100 bbl. of clean oil through perforations at 8,005-8,007 ft., using an 8/64-in. choke, with flowing pressure on tubing at 1,100 psi. Gravity of the crude was 43.7°. This well is in 9-7s-5e, approximately 2 miles north of Springville, and more than 15 miles northeast of any production in Louisiana. This is the first production on the east side of the Amite River, and north of Lake Pontchartrain. The flow of oil is coming from the Catahoula section of the Miocene sands, which dominate a major portion of production in the southern section of Louisiana. Total depth is 8,748 ft., with 7-in. casing cemented to 8,563 ft. A test of the deep sands from 8,273-280 ft. showed some oil and salt water. Operators continue to test the interval from 8,005-8,007 ft.

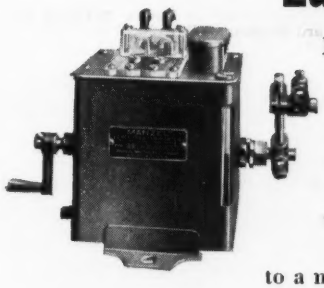
Oil production in the Hurricane Creek field, Beauregard Parish, has been extended 1 mile eastward by Magnolia Petroleum Co. H-1 Doornbos-McPherson, 25-5s-8w. The well was drilled to a total depth of 9,100 ft., and plugged back to 8,300 ft. On completion test, through perforations at 8,280-8,287 ft., using ⅛-in. choke, the well flowed at the rate of 38 bbl. of 46.5°-gravity oil per day with flowing pressure on the tubing at 100 psi. Gas-oil ratio was 694.

Roeser & Pendleton, Inc., 2 Columbia Land & Timber Co., 27-6s-13w, approximately 1 mile south of the Bancroft field, confirmed deep oil production from the Wilcox sands in the new South Bancroft field, Beauregard Parish. Total depth is 10,478 ft., with 5½-in. casing to 10,477 ft. On potential test the well flowed 440 bbl. of 41.6°-gravity oil per day with flowing pressure at 2,600 psi., using a 12/64-in. choke. Production is through perforations at 10,277-10,235 ft.

**SOUTH LOUISIANA WILDCAT FAILURES**

Calcasieu Parish: W. B. Jayred 1 Industrial

## Lubricators



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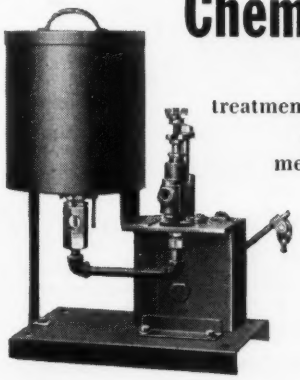

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Lumber Co., 13-9s-12w, Northwest Edgerly area, dry, TD 9,130 ft.

Jefferson Parish: Gulf Refining Co. 1 Louisiana State Lease 1304, in Little Lake, 17s-23e, dry, TD 12,500 ft.

# MICHIGAN

## Western Michigan Gets New Dundee Field

MOUNT PLEASANT.—Producing at a restricted flow-rate of 10 bbl. an hour for the past week, McClanahan Oil Co. and George F. Herr 1 Dykstra, NE SE NE 34-15n-18w, Golden Township wildcat, Oceana County, appeared to have opened an important new Dundee oil field in western Michigan.

The 1 Dykstra was bottomed out in the Dundee at 2,211 ft. with hole filling with oil natural and making at least one headflow before being acidized. Immediately following acid treatment with 500 gal., flowing production kicked off at a rate as high as 50 bbl. per hour. Production was pinched back to 10 bbl. per hour.

McClanahan Oil Co. and Herr staked two new locations in the area and preparations were in progress for immediate drilling. The first two tests to follow this new wildcat producer will be the NE NE NE and the SW NE NE, 34-15n-18w, the diagonal northwest and direct north 20-acre offsets. These offset tests will be drilled by a combination rotary and cable tool setup. Further production tests were being made prior to final completion of the discovery producer.

A possible new Dundee oil field was in prospect for the central Michigan basin area as Socony-Vacuum Oil Co. 1 Wolverine Power Co. et al, SW SE SE 2-17n-1e, Billings Township, Gladwin County, was being tested in the Dundee at a total depth of 3,555 ft. with 1,100 ft. of free oil showing natural. Oil was encountered approximately 180 ft. below the top of the Dundee. Swab tests were being started prior to acidization.

### MICHIGAN WILDCAT FAILURES

Allegan County, Hopkins Township: Gordon Oil Co. and Basin Oil Co. 1 Anderson, SE SW NE 35-3n-12w, dry in Traverse, TD 1,733 ft.

Lee Township: Ohio Oil Co. C.T. A-36 U.S.A., NW SW NE 4-1n-15w, dry in Traverse, TD 1,273 ft.

Valley Township: Ohio Oil Co. C.T. A-25 U.S.A., NW NE NW 34-2n-14w, dry in Traverse, TD 1,371 ft.

Lake County, Newkirk Township: Samuel G. Hindman 1 Maiville, NW NE NE 24-19n-12w, dry in Monroe, TD 3,444 ft.

Van Buren County, Geneva Township: Leonard C. Sleep 1 Roper, Sr., NE NW SW 15-1s-16w, dry in Traverse, TD 1,076 ft.


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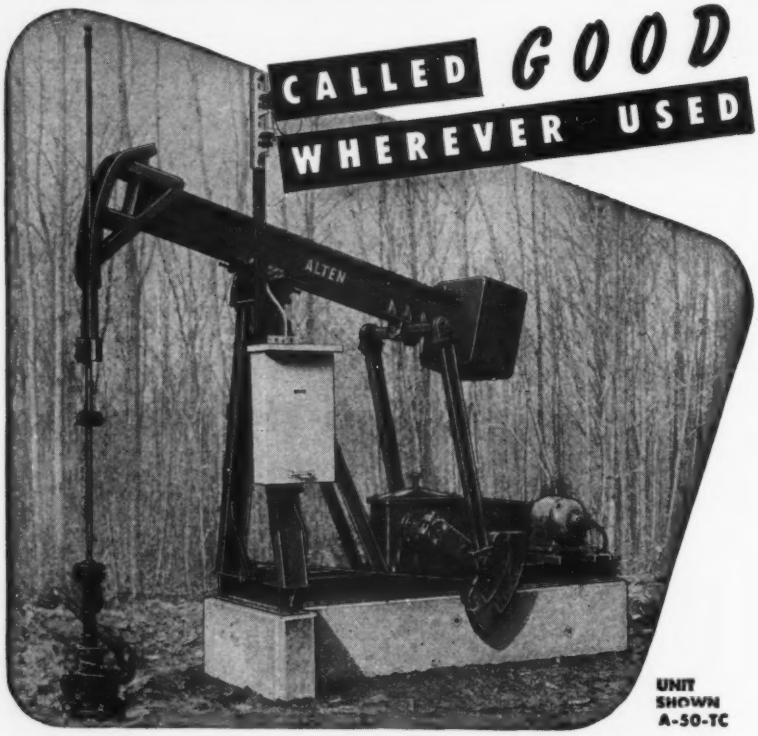


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# CANADIAN FIELDS

## Imperial Gets Oil Strike Southwest of Redwater

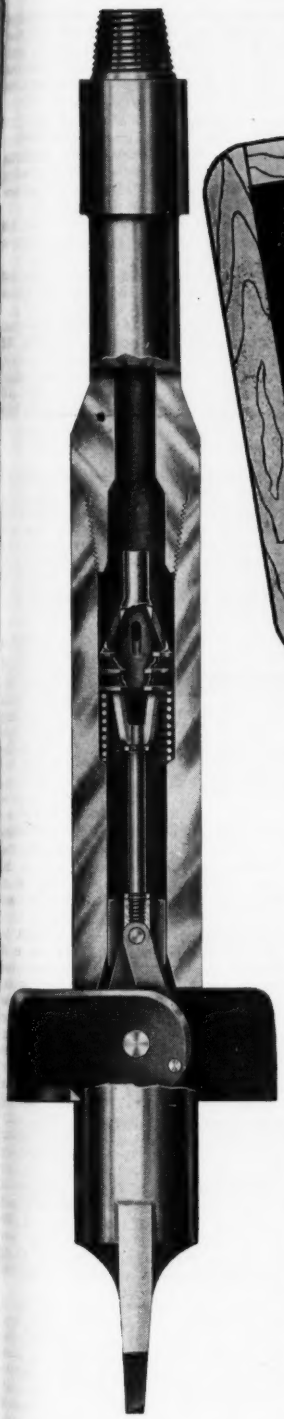
CALGARY.—The past week brought a new oil strike for Imperial Oil, Ltd., at Bon Accord, about 18 miles north of Edmonton and 12 miles southwest of the main section of the Redwater oil field. During a drill-stem test from 3,585-3,608 ft. a flow of 35°-gravity crude oil was brought to the surface 39 minutes after tester opened, indicating commercial production. This discovery was made in a zone equivalent to Leduc'c D2 Devonian horizon. Tests revealed 23 ft. of clean oil-bearing limestone before the water level was established. The well, Imperial-Bon Accord 1, LSD 1, 23-56-23w4, is now drilling below 3,724 ft. searching for the equivalent to Leduc's and Redwater's D3 zone.

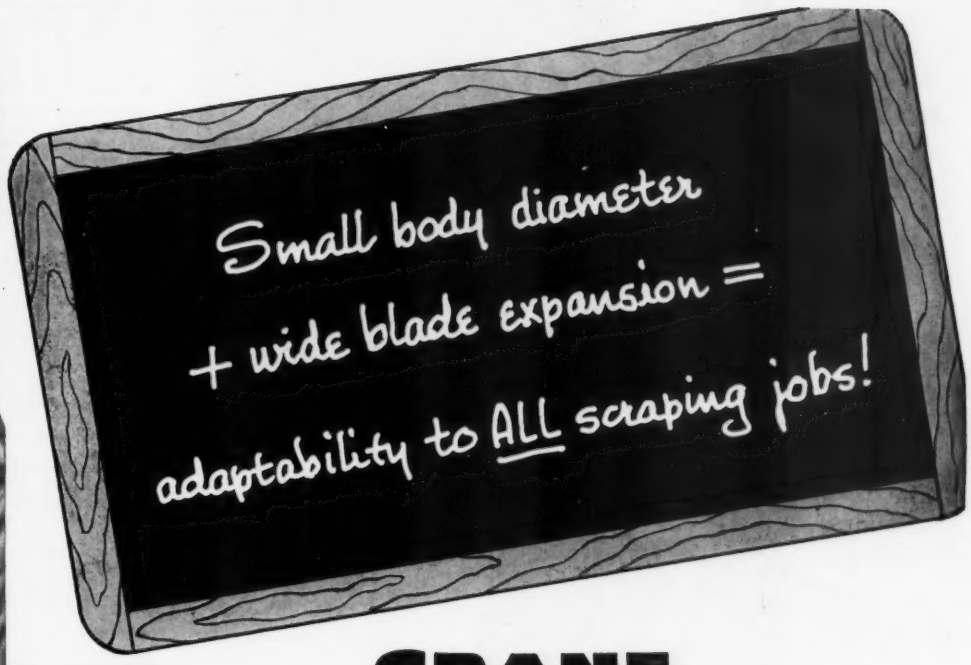
**Schoepp.**—Imperial-Schoepp 1, LSD 9, 22-51-27w4, oil discovery in the D3 zone of the Devonian, is continuing coring and testing at 5-ft. intervals in the D3 zone. Results of tests make the wildcat look like an important oil discovery. There has been 59 ft. opened up below the base of the 7-in. casing at 5,363 ft., and each test has given flows of oil and gas with no signs of water. Leduc-Woodbend D3 zone has an oil column between 35 and 40 ft. in thickness. Coring and testing is now continuing at the 5,427-ft. level. The Schoepp 1 is located about 4½ miles west of the current producing boundaries of the Woodbend field. The fact that the indicated oil pay is somewhat thicker than at Leduc and Woodbend, and the additional fact that elevation of the pay is lower, now provides fairly clear evidence that the well marks the beginning of a new field, rather than an extension of the Leduc-Woodbend pools.

**Stettler.**—Western Canadian Oil Co., a unit of the major American Gulf Oil Corp., is going to probe the Cretaceous and Devonian in search of oil and gas in the Stettler-Delburne area, about 90 miles northeast of Calgary. Other Gulf units have already drilled two deep tests in the general area, while independents have so far completed two wells on lands secured from Gulf. The new venture, B. A. Pearson 1, LSD 14, 2-38-22w4, is on a separate structural feature located 5 miles west and a little south of the Piccadilly-Interleduc 2, down flank follow-up of that team's "wet gas" discovery in the basal Cretaceous.

Western Canadian's new venture will probe formations down to and including the Devonian, with probable completion depth around 6,000 ft. Location is based on seismograph work and structure-test core drilling carried out by the Gulf group.

**Barrhead.**—Stanolind - Imperial - Barrhead 1, Madison limestone oil discovery 55 miles northwest of Edmonton, has completed a 19¾-hour flow test which yielded an aver-



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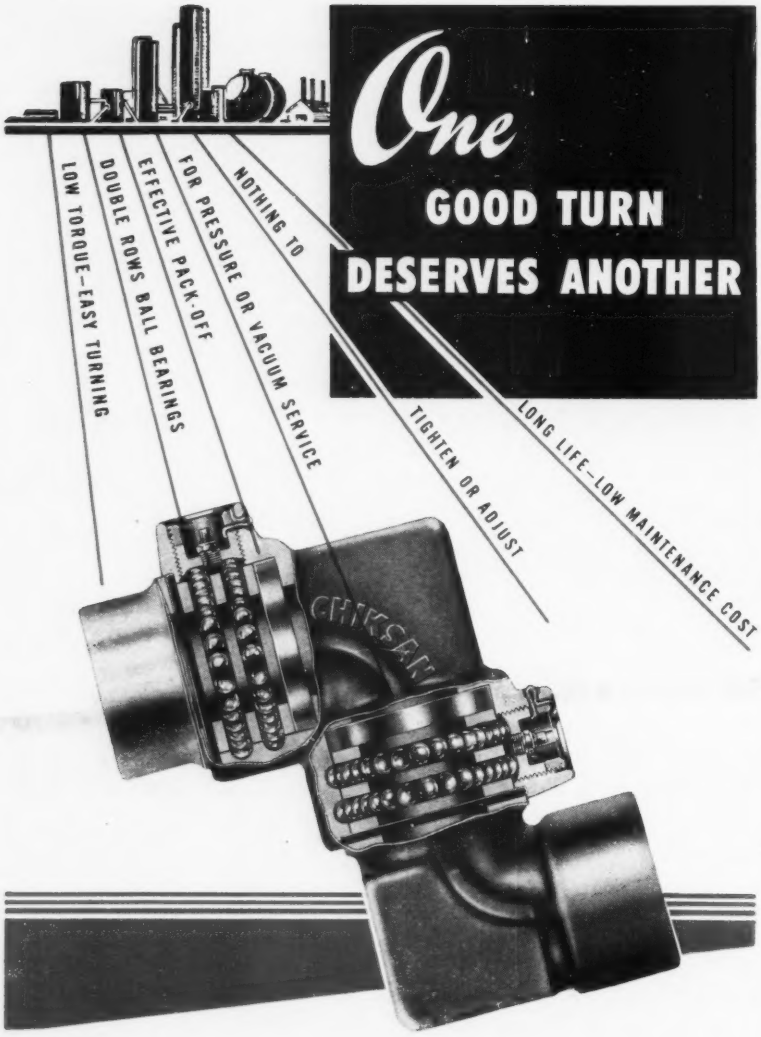


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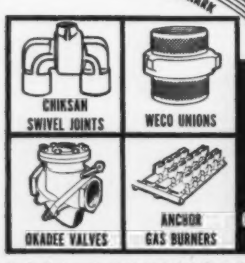


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age of 35 bbl. hourly, for an indicated oil potential of 842 bbl. daily. Natural gas flow is estimated at 5,000,000 cu. ft. daily, indicating a gas-oil ratio of between 5,900 and 6,000 cu. ft. per barrel. During the test, the well produced 693 bbl. of 24.4°-gravity oil.

**Woodbend.**—Imperial - Woodbend 14, LSD 11, 9-51-26w4, has been placed on steady production with initial open flow potential of 1,365 bbl. daily. The well completed in D3 Devonian pay at 5,320 ft., cased to bottom, gun-perforated from 5,305-10 ft. with 35 shots, and then acidized.

**Black Diamond.**—Anglo-Black Diamond 1, LSD 12, 12-20-2w5, found water in the lower porous section of the Madison limestone, and has plugged back to base of the upper porous horizon for test of oil and gas possibilities of that zone after acidization. The well ran drill-stem test from 9,233 ft. to bottom at 9,309 ft. and received a 2-hour pipe recovery of 1,080 ft. of drilling mud, 540 ft. of gassy black sulfurous fluid, and 4,470 ft. of gassy sulfurious salt water. The hole has been plugged back to 9,080 ft. with 45 sacks, preliminary to the upper zone acidizing.

**Craigmyle.**—Socony-Craigmyle 1, LSD 12, 32-32-6w4, oil discovery in the Madison limestone, has drilled to total depth of 6,807 ft., and has run Schlumberger log and velocity surveys. Crew is preparing to test at bottom 6,807 ft. If tests at total depth are negligible or unsatisfactory, the well will be plugged back to the Madison and gun-perforated for production test.

## EASTERN TEXAS

### Bowie County Test Cores, Drills Ahead

DALLAS.—Gulf Oil Corp. 1 John Veach, Jacob McFarland Survey wildcat, Bowie County, drilled ahead below 7,718 ft. in sand and shale after extensive coring from 7,544 ft. The last marker called was a tentative top on the Travis Peak around 6,500 ft., with elevation at 242 ft. Fifty feet of recovery from 7,544-94 ft. was 11 ft. of sand having slight porosity and permeable streaks, salty taste, and no shows; 6 in. of shale; 6½ ft. of porous sand, with no shows; 5 ft. of conglomerate and siltstone; 3 ft. of brown-red fine sand with slight porosity; 18 ft. of sand and shale; 1½ ft. of fine brown sand with sulfur odor; 6 in. of gray shale, 3½ ft. of gray siltstone and 6 in. of lignite.

Jack Frazier and Bill Reiter 1 Steubenrauch, northwest of Mexia in Limestone County, was drilling sand and shale at 7,233 ft. In Nacogdoches County, an unconfirmed report on Humble Oil & Refining Co. 1 Thurman Crawford, 1¾ miles west of Linn, said a drill-stem test of the Upper Glen Rose from 6,736-6,801 ft. showed gas immediately, which was burned for 1 hour and shut in. Recovery was said to be 35 ft. of mud cut with dry gas.

Humble Oil & Refining Co. 1 J. W. Minton, 9 miles northeast of Hemphill in Sabine County, killed the flow of salt water with mud, then drill-stem tested the upper Glen Rose at 6,478-6,542 ft., using 1,000 ft. of water cushion. The well flowed the water cushion, then muddy salt water after the tool was open 3 hours. Maximum surface pressure was 60 psi. Total depth was 6,542 ft. Operators were mixing mud and jel to kill the flow.

New operations in East Texas included a Woodbine test 15 miles southwest of Corsicana, in Navarro County, by Morris Coats, Longview, who was reported to have obtained the acreage from Stanolind Oil & Gas Co. Application to drill was filed as the 1 H. L. Wickham, 330 ft. from the most northerly corner of the 100-acre tract in the Samuel Benton Survey, Block 63, A-44, Eldorado Ranch Subdivision.

Pure Oil Co. staked location for 1 C. C. Baldwin, 12 miles southeast of Carthage in Panola County, on a 647-acre tract in the H. McKelvey Survey. It is 6,650 ft. north-

west of Pure's 1 Menefee. Supporting companies in the venture are Columbia Fuel Corp., Amerada Petroleum Corp., Devonian Oil Co. and Central Commercial Co.

In Cherokee County, work was to get under way on a 5,300-ft. Woodbine exploration in the old Rusk field, 7 miles southwest of Rusk, at J. B. Dial 1 New Birmingham Development Co. Location is 330 ft. from east and 1,042 ft. from south lines of a 120-acre tract in the Jordan Survey.

An important 1-mile extension to the Merigale-Paul field of Wood County was reported at Sun Oil Co. 1 Mount Enterprise Church, J. Swift Survey. Operators were running casing to bottom at 4,859 ft. for completion attempt after a 40-minute drill-stem test in the sub-Clarksville at 4,827-54 ft. recovered 60 ft. of mud, 270 ft. of oil and 330 ft. of oil-cut mud.

# CALIFORNIA

## Cuyama Valley Activity Shows Great Increase

LOS ANGELES.—Exploration activity in the Cuyama Valley in Santa Barbara and San Luis Obispo counties is showing a marked increase and is doubtlessly being stimulated by the recent success of several outpost wells. A large number of key tests are to be drilled this year at considerable distance from the proved area of the Russell Ranch field, presently the only field in the valley. Several locations for rank wildcats were made this week.

Noah S. Andrews of Taft is preparing to drill the 2 Hazel T. Leingang in Section 24-10n-28w, about 3 miles southwest of production. One mile to the northeast, Producers Oil Corp. of Bakersfield has made a location for the 82 Hinsdale, 18-10n-27w. Eight miles northwest of production, Texas Co. is drilling the 1 Edgar, 12-32s-19e, currently below 2,600 ft. Attention is also focused on an area about 15 miles southeast of the Russell Ranch field where Richfield Oil Corp. and Humble Oil & Refining Co. have tests under way. In this general area, Richfield's 1 F. K. Perkins deep test, 27-10n-26w, is now in the spotlight due to reported oil shows at approximately 11,400 ft. Cores are being taken at frequent intervals. A discovery here would be of major importance and further serve to stimulate wildcatting the whole length of the 50-mile valley.

Superior Oil Co. is continuing to drill ahead at its world's record deep hole, 1 Limoneira in 9-2n-22w, Ventura County. Operator last week ran electric logging device at 18,109 ft., later stuck drill pipe, recovered it in a few hours, and is now drilling below 18,210 ft., nearly 400 ft. below its own previous world's depth record. This is still a tight hole and the only information being released by the company is the depth figure.

The Texas Co. has cored oil sand in its San Ardo area wildcat, the 7 Rosenberg, Section 2-23s-10e, Monterey County. Casing has been run to 1,862 ft. and a production test is pending. If successful this well will extend Campbell pool production at San Ardo about 3,700 ft. to the northwest. Superior Oil Co.'s 1 Orradre, 6-23s-11e, a northeastern outpost test of the Campbell pool, is also reported to have had oil showings. Operator has run casing.

The Texas Co. extended production about ½ mile to the west in the Jacalitos field, Fresno County, when its 74 Sherman, Section 20-21s-15e, was completed flowing 515 bbl. of 39.9°-gravity oil through a 20/64-in. choke. Total depth is 3,166 ft. Some additional drilling by Texas and Union Oil Co., which holds adjoining acreage, is anticipated.

A small, shallow discovery has been made in the Tejon Hills area of Kern County by Steele Petroleum Co., 2 Roco, Section 15-11n-18w. Drilled to only 648 ft., this well was completed on the pump for 65 bbl. a day of 28°-gravity clean oil. The location is about 4,000 ft. southwest of another small field discovered last July when Tejon Hills Oil Co. completed a well producing 45 bbl. of 30.8°-gravity oil from a sand between 380 and 407 ft.

### CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Tejon area: Steele Petroleum Co. 2 Roco, 15-11n-18w, pumped 50 bbl. daily, gravity 28°, water cut 4 per cent, elev. 1,005 ft., TD 648 ft.

Santa Barbara County, Cuyama Valley area: Hancock Oil Co. 22-25 Wood-Callahan, 25-11n-28w, flowed 550 bbl. daily, 13/64-in. choke, gravity 34°, water cut 1 per cent, from Temblor-Vaqueros interval at 2,830-3,200 ft., elev. 2,157 ft., TD 3,610 ft.

### CALIFORNIA WILDCAT FAILURES

Kern County, Jasmine area: Morton and Sons 1-16 Quinn, 16-25s-27e, dry, elev. 658 ft., Vedder, 2,870 ft., granite, 3,316 ft., TD 3,317 ft.

Mount Poso area: Providential Development Corp. 2 Hooper, 36-26s-27e, dry, elev. 999 ft., upper Vedder 2,684 ft., lower Vedder 2,890 ft., TD 2,925 ft.

Bacon Hills area: Gene Reid Exploration Co. 1 Temblor, 36-28s-18e, dry, elev. 2,402 ft., converting to water well, TD 3,008 ft.

Monterey County, San Ardo area: Jergins Oil Co. and North American Oil Consolidated 1 Garrissiere, 28-22s-10e, dry, elev. 560 ft., conglomerate 3,088 ft., TD 3,171 ft.

San Mateo County, Half Moon Bay area: E. T. Willard 4 Sarah Wilson, 15-6s-5w, dry, elev. 200 ft., TD 1,600 ft.

San Luis Obispo County, Cuyama Valley area: Mid-Cal Petroleum Co. 1 Community, 9-11n-26w, dry, elev. 2,200 ft., TD 1,447 ft.

Los Angeles County, Newhall area: M. E. Frazier, Operator 2 Eagle-Bishop, 2-3n-16w, dry, elev. 1,260 ft., TD 6,014 ft.


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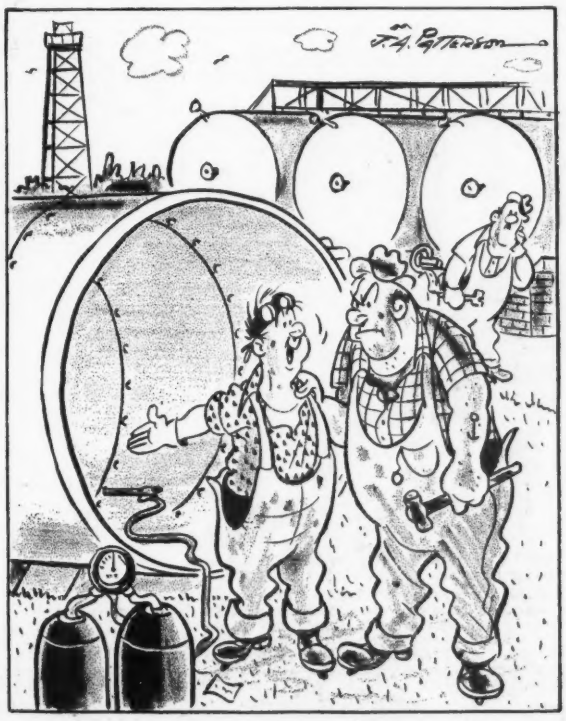


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L. M. Lockhart 1 Miller, 2-3n-16w, dry, elev. 1,250 ft., TD 5,423 ft.

Placerita Canyon area: Carl W. Weller 1-3 White Oil Co., 4-3n-15w, dry, elev. 1,760 ft., TD 2,312 ft.

Santa Barbara County, Santa Rosa Island area: Signal Oil & Gas Co., Honolulu Oil Corp., and Macco Corp. 1 Garanon, 14-2s-32w, dry, elev. 370 ft., TD 3,630 ft.

# ILLINOIS

## Gallatin County Wildcat Hits in Rosiclare

MATTOON.—The northern part of Gallatin County has new Rosiclare production at George & Wrather Drilling Co. et al 1 Harry Miner, NW SW NW 24-7s-8e, in the area about 1½ miles northeast of the town of Omaha and about 1½ miles south of production in Roland pool which is across the line in White County. Operator has set casing for further tests of the Rosiclare after a 1-hour drill-stem test at 2,977-89 ft. had gas in 9 minutes and recovered 180 ft. of oil and 30 ft. of salt water. A drill-stem test of the Cypress, which produces in Roland pool, recovered only water. Casing has been set at 3,020 ft. and total depth is 3,055 ft.

In the same general area, George & Wrather Drilling Co. has staked location for another wildcat at 1 William Utley, NE SE SW 34-7s-8e, about 1½ miles south of Omaha.

In Jasper County, Charles Baldwin 1 Clara Burton, NE NE NE 33-6n-14w, is going on pump for tests of the O'Hara at 2,700-04 ft.

National Associated Petroleum Co. and Continental Oil Co. have completed two additional Devonian wells in Assumption, North pool in Christian County. Operators completed 2-B John Lawrence, NW NE SE 9-13n-1e, for 85 bbl. per day and 7 John Lawrence, SE NW NW 10-13n-1e, for 80 bbl. per day. Other wells in this active area produce from the Rosiclare and from the Benoist.

Minerva Oil Co. 1 Alva Lane, NW NW NW 20-11s-10e, Hardin County wildcat, was reported completed in Renault lime at 1,098-1,107 ft. with initial production of 2 bbl. per day on pump after treatment with 1,000 gal. of acid. The county had three unsuccessful wildcats last year.

In White County, C. E. Brehm has another good Cypress well in the area north of Crossville. The well, Brehm 1-A, C. Hon, NE SW NE 34-3s-10e, was completed in the Cypress at 2,834-51 ft. for 150 bbl. per day. This well is a south offset to the recently completely 1 Blackford, which made 110 bbl. per day. These wells are about 2 miles south of West Grayville pool where production is also from Cypress.

**ILLINOIS SUCCESSFUL WILDCATS**

Hardin County: Minerva Oil Co. 1 Alva Lane, NW NW NW 20-11s-10e, IP 2 bbl., Renault lime, 1,098-1,107 ft., TD 1,107 ft.

Wabash County: F. L. Beard 1 B. French, SE SW NW 32-2n-12w, IP 15 bbl., Benoist 2,163-66 ft., TD 2,420 ft.

**ILLINOIS WILDCAT FAILURES**

Clay County: Head Oil Co. 1 M. B. Tully et al, NE NW NE 10-2n-5e, dry, TD 3,019 ft.

Lawrence County: George & Wrather 1 S. Williams, SE NE SW 9-3n-11w, dry, TD 3,326 ft.

Marion County: Phillips Petroleum Co. 1 Garrett, NW NE NE 10-4n-3e, dry, TD 2,301 ft.

Richland County: Joe Slevka & Sons 1 Lathrop, SE NE SW 1-3n-14w, dry, TD 3,202 ft.

Saline County: G. C. Schoonmaker 1 Pemberton-Parks, SE SE SW 33-7s-7e, dry, TD 3,115 ft.

Wabash County: Illinois Mid-Continent Co. 1-C Kieffer heirs, NW NE NW 32-1s-12w, dry, TD 2,512 ft.

# LA.-ARK.

## Claiborne Wildcat Cores No Shows

SHREVEPORT.—H. W. Klein et al 1 A. H. Sims, approximately NW SE 34-20n-5w, between the Sugar Creek and Lisbon fields in Claiborne Parish, stopped to core in the Cotton Valley at 9,005-16 ft. Recovery was 2 ft. of sandy lime with no shows, 1 ft. of hard- nonporous sandy lime with gas odor, and 8 ft. of the same with no shows. From 9,134-37 ft. a full recovery was hard, tight sand with salty taste. A 2-ft. recovery from 9,170-75 ft. was gray sand with light gas odor and from 9,175-86 ft. there was gray sandy shale with no shows.

Southwest Gas Producing Co. 1 W. I. Burgess, southeast of the Lisbon field in 8-20n-4w, Lincoln Parish, was scheduled for a rework job when salt water was recovered in swabbing. Earlier in the month the well flowed 5,200,000 cu. ft. of gas, plus some distillate, through 7/16-in. choke from perforations at 8,684-8,702 ft. It was then shut in to await state gage but would not flow when reopened. Perforations are in the Vaughn section of the Cotton Valley formation.

Sohio Petroleum Co. 1 G. E. Raworth, Tensas Parish wildcat in 26-12n-10e, was dry in the Paluxy at 9,130 ft. Cores in the Tuscaloosa from 8,350-8,423 ft. had faint to good shows of gas and distillate. Sidewall cores from 8,412-23 ft. showed distillate odor and taste, but cores from 9,052-68 ft., in the Paluxy, had no shows.

Other wildcat reports included: Barnsdall Oil Co. 1 Ardis, Bossier Parish, drilling below 7,333 ft. In Caddo Parish, S. M. Aronson 1 Sentell, 23-19n-14w, drilling in the lower Glen Rose below 4,598 ft. Phillips Petroleum Co. 1 Ellerbe, coring no shows in tight sand at 8,699 ft. Hunt Oil Co. 1

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Owens, 13-23n-7w, East Haynesville field, Claiborne Parish, was drilling below 10,413 ft. in the Cotton Valley. Hunt's north outpost, the 1 J. R. Smith in 10-23n-7w, was in the Travis Peak at 9,585 ft. Continental Oil Co. 1 Mansfield, Winn Parish, was below 8,780 ft.

**NORTH LOUISIANA WILDCAT FAILURE**

Tensas Parish: Sohio Petroleum Co. 1 G. E. Raworth, NW SW 26-12n-10e, dry, TD 9,130 ft., Wilcox 3,059 ft., Midway 5,650 ft., Cretaceous 6,370 ft., Tuscaloosa 7,570 ft., Paluxy 8,830 ft., elev. 80 ft.

**ARKANSAS WILDCAT FAILURE**

Union County: C. M. Bagley 1 Union Saw Mill, SE SE NE 28-19s-13w, dry, TD 2,308 ft., Arkadelphia 2,071 ft., Nacatoch sand 2,242 ft., elev. 206 ft.

# OHIO, KENTUCKY

## Wildcat Drills Ahead After Gas Shows

COLUMBUS.—A wildcat being drilled by Wasson & Co. on C. H. Hunt in Lot 33, Washington Township, Tuscarawas County, found a show of gas in the first Berea at 884-932 ft. and 619,000 cu. ft. of gas at 934-40 ft. The company expects to case off the gas and continue on down to the Oriskany sand as originally planned.

William Hoey et al 2 B. J. Walzak, Lot 42, Parma Township, Cuyahoga County, showed only a small amount of oil and gas in the Oriskany, and was deepened to the Clinton. The red Clinton at 3,076-3,116 ft. gaged 1,940,000 cu. ft. of gas and was tubed natural.

William Pfeiffer extended the Richville gas pool nearly 1 mile with a small gasser on Rosa C. Stump, Section 27, Perry Township, Stark County. The White Clinton at 4,400-30 ft. gaged 200,000 cu. ft. of gas natural and 789,000 cu. ft. with 1,320 psi. when shut in after shot.

E. O. White et al have taken over the Armintrout wildcat in Scioto Township, Pike County, and are reaming the hole with the intention of testing formations below the St. Peter, which carries water here.

The East Ohio Gas Co. has started drilling on its wildcat on W. Garaux in Section 17, Sandy Township, Stark County.

**EASTERN KENTUCKY**

ASHLAND.—In Lee County, 19-N-69, Jack Kindred is drilling at 3,284 ft. at the 1 C. J. Sipple, a rank wildcat deep test. Previously the St. Peter sand had been topped at 2,940 ft. carrying water, and the Knox dolomite was found at 2,958 ft. with water about 200 ft. in that formation. Operators may run 5½-in. casing before drilling much deeper.

In Martin County and on the waters of Wolf Creek, Virginian Oil & Gas Co. is drilling below 2,200 ft. at the 9 W. J. Parks. A show of oil was had in the Big lime at 1,510 ft. Operators will drill to the Berea and Devonian black shale before completion.

In Pulaski County, 15-G-60, Onie Hamilton et al is drilling at 580 ft. at the 1 Dora Hamm, a new Knox wildcat test. The well is located 3 miles south of Somerset, the county seat.

**WESTERN KENTUCKY**

OWENSBORO.—In the east extension of Uniontown pool of Union County, Faletti & Turner 1 Pleasant, 17-P-20, is rigging up cable tools to plug back to 2,298 ft. for tests of the Cypress. The Pleasant well is a southwest diagonal offset to 1 Randolph that opened the extension area with production of 50 bbl. per day.

In the Hitesville area of Union County, Carter Oil Co. is cleaning out and testing the Waltersburg at 1 Culver heirs, 24-P-21, southeast of Robinsonville. The Waltersburg


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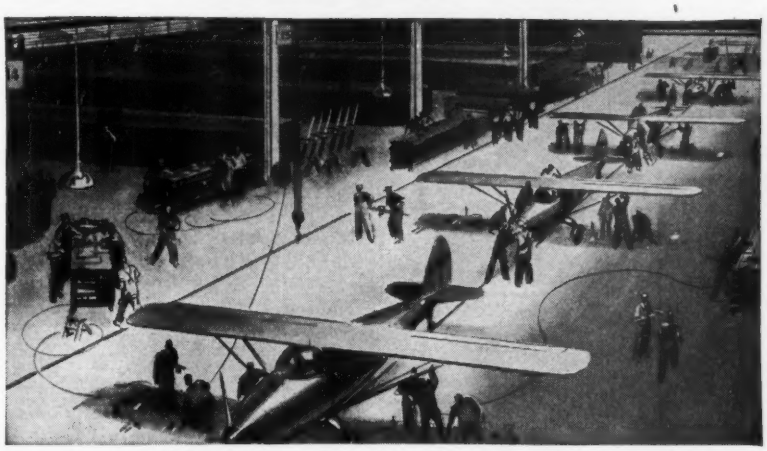

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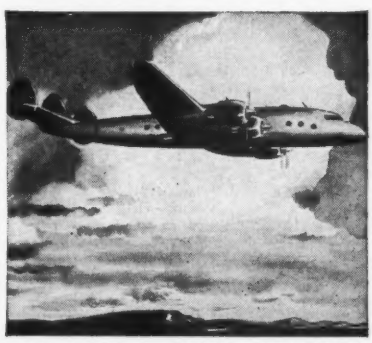

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was called at 1,695-1,702 ft. and the well is reported to be swabbing about 20 bbl. per day.

Operators have completed 3 oil wells and 3 dry holes in the area north of Griffiths pool in Daviess County. Completions in Sections 4 and 6 of P-28 averaged about 40 bbl. per day from the Palestine at depths just under 1,000 ft. This area, east of the town of Stanley, has been very active since the latter part of December and still has 13 tests either active or staked locations.

### INDIANA

EVANSVILLE.—Posey County has new Cypress production at Mitchell & Heppard et al 1 E. Thomas, NW NE SE 24-7s-13w, about 3½ miles southeast of Mount Vernon and a little more than 1 mile north of the river. Operator is rigging up cable tools to test the Cypress after a 2-hour drill-stem test at 2,358-63 ft. recovered 740 ft. of oil, 100 ft. of mud-cut, and 270 ft. of salt water. The well is about 1 mile southeast of La Mott pool but this pool does not produce from the Cypress.

In Vanderburgh County, S. D. Jarvis 1 Ira Barton, NE NE SE 34-4s-10w, is cleaning out for further tests of the Rosiclare. The well had a good show on a drill-stem test at 2,160-80 ft. but later was having some trouble with salt water.

In Posey County, B. M. Heath has set casing at 1 G. M. Cullman, NE NE NE 34-7s-14w. The well had a show of oil in the Mansfield, called at 1,135-58 ft., and operator has set casing on top of the pay. Total depth is 2,767 ft.

Carter Oil Co. has completed 2 Sanders, SW SW NW 32-5s-13w, northeast part of Springfield pool in Posey County, with initial production of 48 bbl. per day from the Mansfield at 1,127-38 ft. and the Waltersburg at 2,112-15 ft.

### INDIANA WILDCAT FAILURES

Clay County: C. F. Kumpf 1 C. W. Kumpf, SW NW SE 24-12n-7w, dry, TD 1,473 ft.

Huntington County: Vegars Oil Co. 1 Delmar Allen, SW SW SW 32-27n-10e, dry, TD 1,065 ft.

Jefferson County: H. R. Burton 1 Sand-Cheatam, SW SE SW 32-4n-8e, dry, TD 1,580 ft.

Knox County: S. D. Jarvis 1 H. A. Starrett, NE SW NE 20-2n-8w, dry, TD 1,890 ft.

A. J. Slagter, Jr. 1 Stoelting, SW SW NW 13-5n-8w, dry, TD 2,510 ft.

Martin County: J. J. Lynn 1 Helen Thompson, SW NE NE 17-4n-3w, dry, TD 1,479 ft.

Sullivan County: W. A. Rehfield et al 1 Richard Taylor, NE SW SE 4-9n-9w, dry, TD 2,213 ft.

Kingwood Oil Co. 1 Drake, NW NW NE 13-9n-10w, dry, TD 1,515 ft.

Vigo County: Walker & Welker 1 J. A. Phillips, NE NE SE 17-10n-8w, dry, TD 1,980 ft.

## Leases Announced for 38,576 Acres in Michigan

The Lands Division, Michigan Department of Conservation, has leased at public action 38,576 acres of state-owned lands for oil and gas development.

All but 120 acres of the lands leased were classified as wildcat. These leases brought a total bonus bid of $42,877. Wildcat lands drew total bids of $41,726, an average of $1.09 per acre, while so-called proven leases brought bonuses of $1,151, an average of $9.59 per acre.

One proven lease in the Beaver Creek Richfield pool, Crawford County, was bid in for the minimum $1 offer. Other proven leases were in the Richfield field, Roscommon County.

# Storage Shortage Factor In Adjustment Problems

*(Continued from page 38)*

would permit a gradual reduction of the material in his storage tanks and allow him to get back in a balanced position. After that he could step up his crude runs to stills to a normal rate. This is exactly what the refiners have been doing; each in his own way, to a degree that solves his individual problem and gets his particular plant back in what he considers a proper balance.

When the refiner cut back on his crude runs to stills, he had to cut down on his purchases of crude oil. His residual fuel stocks were so high, he had not extra tanks for crude. But neither did the pipe-line companies, or the crude-oil purchasing companies. During the war the military had scoured the country for idle steel tankage, bought it, dismantled it, and shipped it to the far corners of the world. Since the war, the steel shortage has prevented any large tankage construction except where absolutely necessary for a particular local operation, usually in connection with new plant or facility construction.

### Refiners Adjusting Runs

As a result, once the refiners cut down their crude runs to stills, crude production had to be cut, because there was simply no room above ground for storage of the extra crude oil.

Individual refiners are adjusting their crude runs to their storage position and their current shipments of refined products. They are also reducing their crude purchases in accordance with their individual position with respect to crude oil and residual fuel-oil tankage. Imports of crude oil and imports of heavy fuel are being cut back gradually. There is a certain amount of time lag here, because of the transportation time factor. Contract commitments for purchases of domestic crude sometimes complicate the picture, and account for time lags in an individual refiner's crude stock build-up as compared to the over-all industry trend.

While official figures for stocks as of January 1, 1949, are not yet available from the Bureau of Mines, a close approximation is possible. The tabulation below shows the estimated industry position on January 1, 1949, as compared to the previous year when stocks were so low that there were spot shortages of oil for consumers to the extent of about 1 per cent.

Taking a round figure of six million barrels daily supply and demand the above table indicates the refiners have a storage capacity equal to 60 days' supply or demand. Pipe-line, tank-farm, and lease stocks total roughly 30 days' supply or demand

**PETROLEUM STOCKS—MILLIONS OF BARRELS**

| At refineries— | 1/1/49* | 1/1/48 | Difference |
|---|---|---|---|
| Gasoline | 104 | 94 | +10 |
| Kerosine | 24 | 16 | +8 |
| Distillates | 77 | 50 | +27 |
| Residual fuel oil | 86 | 51 | +35 |
| Crude oil | 66 | 56 | +10 |
| Sub-total | 357 | 267 | +90 |
| Other crude-oil stocks— | | | |
| Pipe line and tank farm | 171 | 160 | +11 |
| On leases | 17 | 16 | +1 |
| Sub-total | 188 | 176 | +12 |
| Grand total | 545 | 443 | +102 |
| Clean stocks† | 205 | 160 | +45 |
| Dirty stocks‡ | 152 | 107 | +45 |

*Estimated. †Gasoline plus kerosine plus distillates. ‡Residual fuel oil plus crude.

at the same rate. They also indicate that as of the past year, the refiners had a 33⅓ per cent flexibility. That is between last year's bottom of 267 million barrels (which was a shade too low), and this year's high of 357 million barrels (which is too high), the increase is 33⅓ per cent. It is noticeable that this 90-million-barrel increase in refinery storage is divided evenly between clean and dirty stocks. All other storage between the well and the refinery tank farm appears to be geared very closely to day-to-day operations, with very little slack.

### Individuals Will Decide

The question of whether large additions to storage capacity are urgently needed is one that will be decided by the composite decisions of several hundred individual refiners and pipe-line operators. As a matter of efficiency and to prevent above-ground waste, everyone is agreed that excessive above-ground stocks of crude and products should be avoided. On the other hand, refinery operations demand a certain flexibility, which necessitates having substantial stocks of various grades of crude oil on hand. Then the refiner can schedule sustained runs of a given type of crude to meet orders for certain specification products, or can shift quickly to another crude, if a sudden influx of large orders come for a different specification product. The refiner must also build up his stocks and draw down on them in the seasonal pattern determined by weather and demand.

The pipe-line and tank-farm operators must have sufficient tankage to segregate various types of crude. Different types of crude must be accumulated for batching large slugs through the lines, or for loading tankers, in accordance with the refiners' demands.

As the steel shortage eases, no doubt these hundreds of different operators will examine their particular problems and decide whether or not they need additional storage capacity. If any one of them decides the added flexibility increases over-all efficien-

cy and cuts his costs enough to pay out the investment in new storage, then he will build more tankage. It goes without saying that increased volume of business eventually demands a larger inventory, and therefore more storage space. But these are individual decisions, dependent on how much the particular individual's business increases.

## Hallanan Says Imports Of Oil Are Declining

*(Continued from page 37)*

though drilling materials are more readily available today than they were a year ago, well completions from January 1 to February 5 were 11.5 per cent less than in the same period in 1947. It is undoubtedly true that unusual weather conditions had some part in this very marked decline.

"We are all conscious that the increase in imports was made in good faith and in response to a very real need existing at the time. Many months were required to build imports up, and it is obvious that because of contractual obligations and the physical problems involved, they cannot be substantially reduced overnight. In all fairness to the large importers it must be remembered that in planning their program for the last half of 1947 and the full year of 1948 they assumed that there would be a continued increased in demand, as forecast by industry and government economists.

"While the anxieties of the industry have been based upon realism, there has been a tendency to overemphasize the current accumulation of stocks of crude oil and products. When measured in terms of barrels, these inventories have an alarming aspect, but when gaged by the more accurate yardstick of number of days of supply, stocks do not appear to be inordinately high. As a matter of fact, there were fewer days' crude supply in storage during 1947 and 1948 than in any other year since 1919. The average for the last year was 42.5 days. Even during the acute crude shortage of 1945 and 1946 we had a greater number of days' supply than during 1948. Measured by every yardstick of experience over many years, 42 days of crude supply cannot be considered as excessive in terms of national security. We must not overlook the enormously increased rate of consumption, which places current gasoline stocks, for illustration, not out of line with what was regarded as normal a few years ago.

"There is nothing wrong with the industry's economy that cannot be cured within the framework of competitive enterprise and through the application of such practical steps as are now being taken to bring imports into their proper balance. When that has been fully implemented, I have every confidence that the industry will be able to maintain the nation's continued self-sufficiency in petroleum."

## Three Secondary-Recovery Projects in Texas Approved

HOUSTON. — Three secondary-recovery projects for the state were approved this past week by the Texas Railroad Commission.

Permission was granted Sun Oil Co. to return residue gas into the C-1 sand of the Sun field, Starr County. Sun is constructing a gasoline plant in the field designed to handle 20,000 M.c.f. of gas daily with a 80 per cent propane recovery. Gas will ultimately be gathered from the Sun, North Sun, Rincon, North Rincon, and Garcia fields. Transcontinental Gas Pipe Line Corp. is scheduled to take the plant's residue by April 1951. Until that time, it will be stored in the C-1 sand reservoir of the Sun field.

General Crude Oil Co. was granted its application to conduct a pressure maintenance operation in the middle Tegua reservoir, Kirby field, Liberty County.

Approval was granted The Texas Co. to conduct repressuring in the Alfred field, Jim Wells County.

## Penn Grade Association Renews Research Contract

The Pennsylvania Grade Crude Oil Association has renewed its crude-oil production research agreement with Armour Research Foundation, Chicago, calling for an expenditure of approximately $20,000 in 1949.

The research project embraces a fundamental study of the mechanisms by which so-called "wetting agents" might be used to increase the recovery of petroleum by a water-flooding process. The objective is to select an agent which is sufficiently efficient and economical for use by oil producers. The foundation's physical chemistry section has approached the problem through a study of the surface chemistry phenomena involved in water-flooding techniques.

## Prairie Provinces Output Up 60 Per Cent Over 1948

The Prairie provinces' oil industry recorded a 60 per cent production increase in 1948 as compared with 1947 and, today, with only a few weeks of the new year gone, production is running nearly 40 per cent ahead of 1948's daily average and about 125 per cent ahead of 1947.

Gross revenue from production recorded a 92 per cent increase in 1948 compared with 1947, and is now running about 34 per cent more than 1948's average and more than 150 per cent ahead of 1947. Both production and revenue are expected to continue an increase during 1949.

The following survey of 1948 performance, and a comparison with previous and current performance, is based in part on official Alberta and Saskatchewan government returns and in part on estimates where complete data is not yet available.

Oil production during 1948 totalled 11, 824,992 bbl., 32,308 bbl. daily, compared with 7,349,401 bbl., 20,136 bbl. daily, in 1947. Alberta accounts for 10,973,583 bbl., or 29,982 bbl. daily in 1948, compared with 6,809,284 bbl., or 18,656 bbl. daily in 1947. Saskatchewan produced 851,409 bbl., or 2,326 bbl. daily in 1948, compared with 540,117 bbl., or 1,480 bbl. daily in 1947. Current Prairie production is averaging over 45,000 bbl. daily, and is climbing fast.

Gross revenue from oil production in 1948 totalled $36,055,787, or $98,513 daily, compared with 1947 return of $18,693,063, or $51,214 daily. Current Prairie oil revenue is estimated at between $130,000 and $135,000 daily.

## HOWCO to Service Wells by Stanolind Hydrafrac Method

Halliburton Oil Well Cementing Co., Duncan, Okla., has been licensed by Stanolind Oil & Gas Co., Tulsa, to service wells with the latter's Hydrafrac process, developed by Stanolind engineers. Process is designed to increase oil or gas production by fracturing productive formations, thus making it easier for oil or gas to flow through formations to the wells.

Halliburton has been given exclusive license for at least 2 years, George Roberts, Jr., manager of Stanolind's research department, announced, and in addition, Halliburton has the right to license operators in certain foreign countries to use the process on a commercial basis.

Hydrafrac, which gets its name from the fact that it is a process for the hydraulic fracturing of underground formations, was developed at Stanolind's research laboratories, and uses a viscous liquid, such as jellied gasoline or jellied light crude oil, which is pumped into the well under high pressure; the process then splits the oil-bearing formations, and opens cracks through which oil can flow to the well holes. Sand may be suspended in the fluid to help keep cracks from closing by acting as a prop within the fracture. After rocks have been split a liquid chemical may be pumped into the well, which accelerates breaking the fracturing fluid into a thin liquid, thus permitting it to flow out of the well with the oil being produced.

# STATISTICS and

## WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 26, 1949

| | Total of all wells | | | | | 8 wks. | | Wildcat completions and discoveries | | | | | Cumulative total, 1949 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Comp. | Oil | Gas | Dry | Footage | 1949 | 1948 | Oil | Dist. | Gas | Dry | Total | Oil | Dist. | Gas | Dry | Total |
| New York | 28 | 14 | 0 | *14 | 27,104 | 180 | 228 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pennsylvania | 31 | 15 | 3 | †13 | 50,869 | 283 | 431 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| West Virginia | 7 | 1 | 6 | 0 | 19,334 | 80 | 115 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 |
| Ohio | 14 | 7 | 4 | ‡3 | 33,538 | 176 | 157 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 7 |
| Indiana | 19 | 2 | 0 | 17 | 32,680 | 144 | 146 | 0 | 0 | 0 | 9 | 9 | 1 | 0 | 0 | 31 | 32 |
| Kentucky | 14 | 5 | 3 | 6 | 21,517 | 115 | 96 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 7 | 9 |
| Illinois | 37 | 21 | 0 | 16 | 96,787 | 325 | 302 | 2 | 0 | 0 | 6 | 8 | 5 | 0 | 0 | 53 | 58 |
| Michigan | 10 | 4 | 0 | 6 | 21,197 | 142 | 105 | 0 | 0 | 0 | 5 | 5 | 3 | 0 | 1 | 54 | 58 |
| Kansas | 58 | 28 | 0 | 30 | 190,816 | 440 | 417 | 0 | 0 | 0 | 8 | 8 | 8 | 0 | 2 | 58 | 68 |
| Neb., Mo., Iowa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oklahoma | 61 | 30 | 2 | 29 | 225,452 | 507 | 558 | 0 | 0 | 1 | 13 | 14 | 24 | 5 | 2 | 79 | 110 |
| Texas | 200 | 120 | 2 | 78 | 939,755 | 1,845 | 1,513 | 4 | 2 | 0 | 36 | 42 | 59 | 5 | 12 | 312 | 388 |
| North Central (Dist. 7-B & 9) | 57 | 24 | 0 | §33 | 171,617 | 564 | 441 | 1 | 0 | 0 | 13 | 14 | 29 | 0 | 1 | 129 | 159 |
| West (Dist. 7-C & 8) | 47 | 42 | 0 | 5 | 269,725 | 402 | 399 | 0 | 0 | 0 | 3 | 3 | 6 | 0 | 0 | 26 | 32 |
| Panhandle (Dist. 10) | 10 | 8 | 0 | 2 | 34,995 | 193 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastern (Dist. 5 & 6) | 8 | 5 | 0 | 3 | 42,542 | 94 | 76 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 17 | 19 |
| Gulf Coast (Dist. 2 & 3) | 35 | 22 | 2 | 11 | 225,459 | 285 | 261 | 1 | 2 | 0 | 6 | 9 | 12 | 3 | 8 | 62 | 85 |
| Southwest (Dist. 1 & 4) | 43 | 19 | 0 | 24 | 195,417 | 307 | 261 | 2 | 0 | 0 | 13 | 15 | 12 | 1 | 2 | 78 | 93 |
| Louisiana | 24 | 16 | 0 | 8 | 152,574 | 328 | 241 | 0 | 0 | 0 | 3 | 3 | 2 | 1 | 0 | 27 | 30 |
| Northern | 12 | 8 | 0 | 4 | 45,570 | 177 | 147 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 14 | 14 |
| Southern | 12 | 8 | 0 | 4 | 107,004 | 151 | 94 | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 0 | 13 | 16 |
| Arkansas | 3 | 2 | 0 | 1 | 13,787 | 31 | 58 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 10 | 11 |
| Mississippi | 9 | 5 | 0 | 4 | 62,184 | 54 | 63 | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 1 | 12 | 14 |
| Southeastern States | 0 | 0 | 0 | 0 | 0 | 6 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 |
| Montana | 4 | 3 | 0 | 1 | 12,745 | 26 | 31 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 4 | 6 |
| Wyoming | 9 | 4 | 0 | 5 | 49,972 | 81 | 61 | 0 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 18 | 21 |
| Colorado-Utah | 1 | 0 | 0 | 1 | 1,345 | 22 | 44 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 | 6 |
| New Mexico | 14 | 9 | 1 | 4 | 68,150 | 89 | 86 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 0 | 9 | 11 |
| California | 52 | 41 | 0 | 11 | 197,370 | 414 | 403 | 2 | 0 | 0 | 11 | 13 | 8 | 0 | 1 | 73 | 82 |
| Total United States | 595 | 327 | 21 | 247 | 2,217,176 | 5,288 | 5,062 | 8 | 2 | 1 | 101 | 112 | 121 | 11 | 22 | 766 | 920 |
| Total previous week | 600 | 357 | 44 | 199 | 2,101,564 | 4,693 | 4,490 | 10 | 4 | 3 | 85 | 102 | 113 | 9 | 21 | 665 | 808 |
| Total February 28, 1948 | 572 | 323 | 44 | 205 | 2,033,526 | | | 11 | 1 | 4 | 75 | 91 | 115 | 8 | 39 | 757 | 919 |

Service wells included: *14, †13, ‡1, §2.

## CRUDE PRICES AND REFINERY ACTIVITY

### GRAVITY SCHEDULES

| Gravity— | Signal Hill, Calif. | Oklahoma, Kansas | Gulf Coast Tex.* | West Tex.† |
|---|---|---|---|---|
| 18-18.9 | $2.17 | .... | .... | .... |
| 19-19.9 | 2.19 | .... | .... | .... |
| 20-20.9 | 2.21 | $2.25 | .... | $2.12 |
| 21-21.9 | 2.23 | 2.27 | .... | 2.14 |
| 22-22.9 | 2.27 | 2.29 | .... | 2.16 |
| 23-23.9 | 2.30 | 2.31 | .... | 2.18 |
| 24-24.9 | 2.34 | 2.33 | $2.56 | 2.20 |
| 25-25.9 | 2.38 | 2.35 | 2.58 | 2.22 |
| 26-26.9 | 2.41 | 2.37 | 2.60 | 2.24 |
| 27-27.9 | 2.45 | 2.39 | 2.62 | 2.26 |
| 28-28.9 | 2.49 | 2.41 | 2.64 | 2.28 |
| 29-29.9 | 2.52 | 2.43 | 2.66 | 2.30 |
| 30-30.9 | 2.56 | 2.45 | 2.68 | 2.32 |
| 31-31.9 | 2.59 | 2.47 | 2.70 | 2.34 |
| 32-32.9 | 2.62 | 2.49 | 2.72 | 2.36 |
| 33-33.9 | .... | 2.51 | 2.74 | 2.38 |
| 34-34.9 | .... | 2.53 | 2.76 | 2.40 |
| 35-35.9 | .... | 2.55 | 2.78 | 2.42 |
| 36-36.9 | .... | 2.57 | 2.80 | 2.44 |
| 37-37.9 | .... | 2.59 | 2.82 | 2.46 |
| 38-38.9 | .... | 2.61 | 2.84 | 2.48 |
| 39-39.9 | .... | 2.63 | 2.86 | 2.50 |
| 40 and above | .... | 2.65 | 2.88 | 2.52 |

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. (For detailed price changes in all fields see The Oil and Gas Journal, January 1, 1948, page 107.)

### A.P.I. REFINERY REPORT, WEEK ENDED FEBRUARY 19

(Thousands of barrels)

| District— | Crude runs, daily avg. | Production: Gasoline† | Kerosine | Gas & dist. oil | Residual | Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline* | Kerosine | Gas & dist. oil | Residual |
|---|---|---|---|---|---|---|---|---|---|
| East Coast | 784 | 2,240 | 255 | 1,044 | 1,404 | 25,934 | 9,030 | 20,786 | 11,394 |
| Appalachian: | | | | | | | | | |
| District 1 | 98 | 293 | 59 | 61 | 98 | 2,842 | 415 | 866 | 303 |
| District 2 | 73 | 252 | 33 | 52 | 113 | 1,553 | 132 | 217 | 229 |
| Ind., Ill., Ky. | 827 | 2,930 | 398 | 887 | 1,127 | 27,989 | 3,281 | 8,252 | 4,896 |
| Okla., Kans., Mo. | 436 | 1,637 | 146 | 625 | 554 | 12,595 | 657 | 3,044 | 2,354 |
| Inland Texas | 231 | 1,019 | 82 | 157 | 359 | 4,973 | 422 | 567 | 1,070 |
| Texas Gulf Coast | 1,351 | 4,090 | 673 | 2,045 | 1,481 | 19,622 | 2,754 | 9,419 | 9,934 |
| La. Gulf Coast | 442 | 1,310 | 375 | 720 | 381 | 6,338 | 2,201 | 2,640 | 3,170 |
| N. La. and Ark. | 73 | 214 | 60 | 71 | 108 | 2,792 | 351 | 941 | 213 |
| Rocky Mountain: | | | | | | | | | |
| New Mexico | 11 | 40 | .. | 10 | 25 | 90 | 40 | 37 | 33 |
| Other Rocky Mtn. | 139 | 469 | 26 | 217 | 209 | 3,499 | 106 | 1,146 | 858 |
| California | 857 | 2,490 | 82 | 1,111 | 2,258 | 14,306 | 677 | 10,659 | 46,137 |
| Feb. 19, 1949 | 5,322 | 16,984 | 2,189 | 7,000 | 8,117 | 122,533 | 20,066 | 58,574 | 80,591 |
| Feb. 12, 1949 | 5,404 | 17,754 | 2,485 | 7,617 | 8,561 | 119,780 | 20,524 | 61,517 | 82,340 |
| Feb. 21, 1948 | 5,399 | 15,807 | 2,520 | 8,127 | 9,199 | 109,886 | 9,731 | 34,004 | 49,782 |

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 259,553,000 bbl. as of February 19—up 2,654,000 bbl. One year ago 225,519,000 bbl.

### FLAT CRUDE PRICES

Representative posted schedules per bbl.

| | |
|---|---|
| East Texas† | $2.65 |
| Kettleman Hills, California* | 2.14 |
| Beauregard Parish | 2.60 |
| Illinois Basin | 2.77 |
| Pecos County, Texas (Yates) | 2.2 |
| Bradford, Pennsylvania | 4.0 |
| Eastern Ill. and Western Ind.† | 2.7 |
| Tomball, Texas Gulf Coast | 2.6 |

*37°-37.9°. †35° and above.

# TRENDS

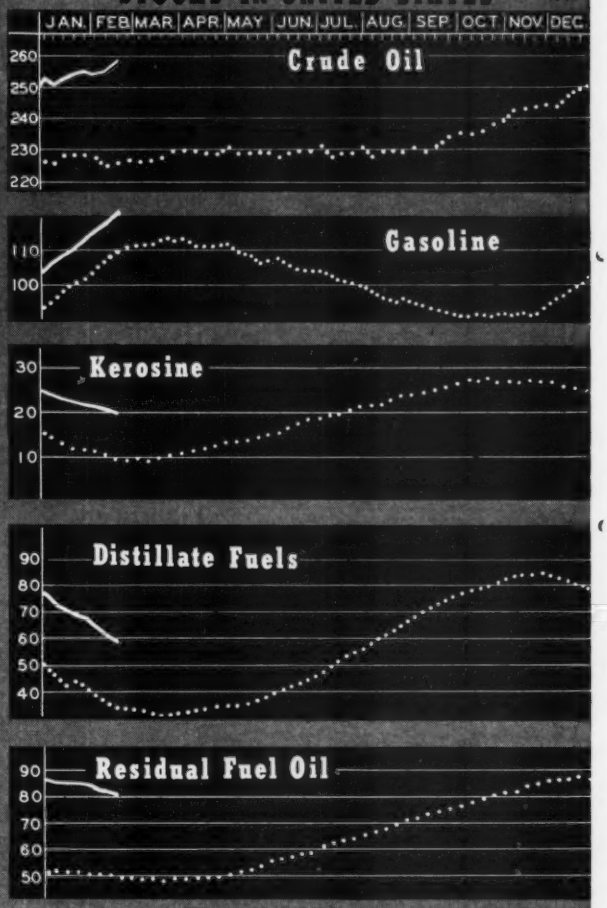
## DAILY AVERAGE PRODUCTION FOR WEEK

| | Feb. 26 crude oil | B. of M. Feb. demand | Feb. 19 crude oil |
|---|---|---|---|
| Alabama | 1,300 | 1,700 | 1,250 |
| Arkansas | 82,450 | 84,000 | 83,050 |
| California | 947,000 | 950,000 | 945,800 |
| Colorado | *59,150 | 52,000 | 60,050 |
| Eastern | 62,100 | 62,300 | 61,500 |
| Florida | 1,150 | 1,300 | 1,200 |
| Illinois | 178,400 | 167,000 | 179,100 |
| Indiana | 22,700 | 21,000 | 24,300 |
| Kansas | 276,550 | 296,000 | 284,350 |
| Kentucky | 23,500 | 22,000 | 22,500 |
| Louisiana | 505,850 | 480,000 | 504,950 |
| North Louisiana | 119,550 | ..... | 118,650 |
| South Louisiana | 386,300 | ..... | 386,300 |
| Michigan | 46,450 | 45,000 | 48,650 |
| Mississippi | 103,500 | 126,000 | 105,600 |
| Montana | 24,300 | 24,000 | 23,500 |
| Nebraska | 300 | 700 | 300 |
| New Mexico | 134,900 | 127,000 | 135,000 |
| Oklahoma | 416,650 | 420,000 | 414,950 |
| Texas | 2,320,950 | 2,420,000 | 2,320,950 |
| Dist. 1 (Southwest) | 27,990 | ..... | 27,990 |
| Dist. 2 (Southwest) | 155,900 | ..... | 155,900 |
| Dist. 4 (Southwest) | 220,025 | ..... | 220,025 |
| Dist. 3 (Gulf Coast) | 442,360 | ..... | 442,360 |
| Dist. 5 (Eastern) | 44,700 | ..... | 44,700 |
| Dist. 6 (Eastern) | 107,425 | ..... | 107,425 |
| East Texas field | 317,200 | ..... | 317,200 |
| Dist. 7-C (West) | 49,950 | ..... | 49,950 |
| Dist. 8 (West) | 660,150 | ..... | 660,150 |
| Dist. 7-B (W. Central) | 65,925 | ..... | 65,925 |
| Dist. 9 (N. Central) | 139,425 | ..... | 139,425 |
| Dist. 10 (Panhandle) | 89,900 | ..... | 89,900 |
| Wyoming | 123,950 | 140,000 | 132,100 |
| Total United States | †5,331,150 | 5,440,000 | 5,349,100 |
| Change from prev. wk., dn. | 17,950 | | |

Total production January 1-February 26 .. ‡312,276,815 bbl.
Same period last year (crude plus cond.) .. 308,429,150 bbl.

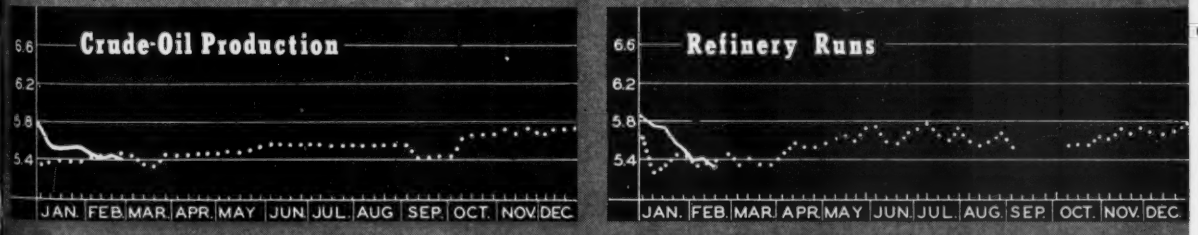
*Incl. 150 bbl. Utah production. †Not incl. 84,120 bbl. condensate. ‡Incl. 4,740,760 bbl. condensate.

## STOCKS IN UNITED STATES — 1948 ···· 1949



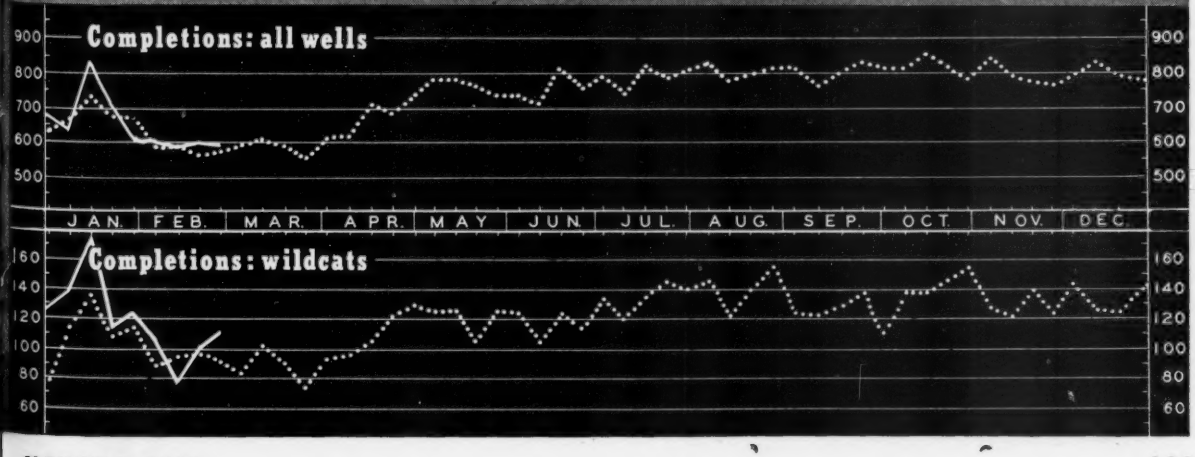

## DAILY OPERATIONS

1948 ····· 1949

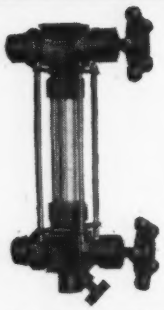



## WEEKLY COMPLETIONS

1948 ····· 1949



PENBERTHY
"ALL IRON"
LIQUID LEVEL GAGES



Body made from a special high strength alloy iron, shanks alloy steel and trim stainless steel. Extra heavy construction throughout, automatic and positive shut-off if glass breaks, heavy duty stuffing boxes. Conform with A.P.I.—A.S.M.E. requirements.

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# MARKETS

NATURAL-GASOLINE prices tumbled another full cent last week, bining 26-70 grade product down to 6 cents Group 3 and 5½ cents North Texas. The drop brought 18-55 grade prices down to 7.2 cents Group 3 and 6.6 cents North Texas.

The new postings, effecive February 23, represented the third drop in natural-gasoline prices since January 31. Together they totaled 2½ cents a gallon. On January 31 prices dropped 1 cent, and on February 9 another half-cent decline was recorded.

Over the nation the products market generally was dull, with ample supplies reported in all areas. Considerable distress material, particularly fuel oils, tended to depress prices.

Demand for residual fuel oil continued to slide and the market for this product was described as softer than it has been in the past 10 years. Long-term contracts for the product were reported again containing the "maximum top price" clause of prewar days which, while it allows for declines in the price of the product, prevents the price from exceeding a certain maximum figure during the life of the contract.

Transportation facilities over the nation were reported more than adequate last week except in areas heavily hit by the recent storms. Unlike the early postwar period, suppliers were expecting little difficulty in transporting products this spring.

### Mid-Continent Prices Lower

In the Mid-Continent area, products were moving at generally lower prices, although it was difficult to determine accurately the high-low spread for individual products.

Scattered small-quantity sales of housebrand gasoline were reported at 8½ cents. Refiners' postings of 10 cents remained unchanged, but rebates on contracts at that figure were reported common. Kerosine was reported available as low as 8 cents a gallon and No. 2 as low as 7 cents. Suppliers caught at this stage of the heating season with storage full of distillate oils were reported offering the products at a sacrifice to make room for prior commitments.

### Harbor Prices Low

Light distillates and heavy fuel oil continued to move at below posted prices last week in New York Harbor. Open market trading was characterized by the price concessions being offered as a result of the more-than-ample supply of these products.

No. 2 heating oil was said to be readily available at 8¼ cents a gallon as against the prevailing posting of 8½ cents. Pointing up the weak condition of the No. 2 market was the action of Sylvestre Oil Co., New York marketing affiliate of Esso Standard Oil Co., in making a new cut in retail prices of this fuel. Sylvestre reduced No. 2 prices by amounts varying up to ½ cent a gallon. New retail price in Manhattan was 11.8 cents with an 0.3-cent discount for deliveries of 300 gal. or more.

Kerosine and No. 6 also were reported moving under postings in barge trading in New York Harbor. No. 6 was said to be on the spot market at $1.85 a barrel, and kerosine as low as 9¼ to 9⅜ cents. On the retail end, Sylvestre also lowered its prices for kerosine by 0.2 cent, diesel 0.2 to 0.4 cent, and No. 4 heavy fuel oil 0.25 cent.

Little motor fuel was involved in open market transactions in the harbor. Activity in this product awaited the beginning of the consuming season in the spring. Spot-market prices mentioned were generally around the posted 10.9 cents for regular.

## Representative Quotations

Representative spot-market quotations of leading suppliers as of February 28, 1949. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

### GASOLINE, KEROSINE, AND FUEL OILS

| | Mid-Continent Group 3 | New York Harbor (barge) | Texas Gulf Coast |
|---|---|---|---|
| Regular gasoline, 73-75 octane | 8½-9¼ | 10-9 | 9¼-10 |
| Premium gasoline, 78-80 octane | 9½-10¼ | 12 | 10¼-11 |
| 42-44 w.w kerosine | 8-8½ | 9.25-10.2 | 8½-9 |
| No. 2 straw fuel oil | 7¼-7½ | 8.25- 8.5 | 7¾-8 |
| No. 6 residual | $1.05-1.15 | $1.85-2.00 | $1.55-1.65 |

### NATURAL GASOLINE

| | Group 3 | North Texas | N. La. |
|---|---|---|---|
| Grade 26-70 | 6 | 5½ | 5¾ |
| Grade 18-55 | 7.2 | 6.6 | 6.9 |

### LUBRICATING OILS
**South Texas**

| | |
|---|---|
| 200 vis., No. 2-3 neutral | 12-13.5 |
| 750 vis., No. 3-4 neutral | 15-16.5 |
| 2,000 No. 5-6 neutral | 17-18.5 |

### LUBRICATING OILS
**Mid-Continent**

| | |
|---|---|
| 150-160 vis., D bright stock, 0-10 pp. | 24 |
| 200 vis., No. 3 neutral, 0-10 pp. | 19 |

**Western Pennsylvania**

| | |
|---|---|
| 144-155 vis. 10 p.t. bright stock | 24.5-27.5 |
| 180 vis. p.t. neutral | 25.5-28.5 |

### CRUDE-SCALE WAX
**Mid-Continent**

| | |
|---|---|
| 132-134 A.M.P. | 8 |

# Your employees want to help you build security

## HERE'S HOW 7,500,000 WORKERS ARE DOING IT

More than 20,000 companies now maintain the Payroll Savings Plan, by which their employees invest in U. S. Savings Bonds automatically every pay day. This Plan builds security not only for the individual employees, but for their companies and for the nation!

As you know, Savings Bonds pay $4 at maturity for every $3 invested. Thus they help create a "rainy-day" fund for each Payroll Saver, increasing *his* security.

### How P. S. P. helps employers

America's leading corporations report these *company* benefits from the Payroll Savings Plan: As Bonds increase the worker's economic peace of mind, plant morale improves. Production increases—because absenteeism, labor turnover, and the accident rate all decline. Relations improve between employer and employee.

Savings Bond dollars are dollars removed from the spending stream. They are deferred purchasing power—an assurance of good business during the years to come. The Treasury uses net Savings Bond dollars to help reduce inflationary credit potential in the banking system by retiring short-term bank-held Federal securities. So Bonds increase the *nation's* economic security, **too!**

### Proof that employees want P. S. P.

Practically everybody wants to *save*. Every one of your employees could be saving *more* if he were obtaining Savings Bonds regularly, right where he works. Even with today's high prices, it has been proved that between 40% and 60% of America's working millions—at any wage level—can and will buy Bonds through Payroll Savings *if management sponsors the Plan and if a fellow worker asks them to sign up.*

Yes—your employees want to help you build security—for all of us. It's up to you whether they get the chance. All the help you need is available from your State Director, U. S. Treasury Department, Savings Bonds Division. While it's on your mind, why not call him? Or write the Treasury Department, Washington 25, D. C.

*The Treasury Department acknowledges with appreciation the publication of this message by*

**THE OIL AND GAS JOURNAL**
**TULSA 1, OKLAHOMA**

*This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council.*

# EQUIPMENT MEN ... in the News

## American Iron & Machine Shifts Representatives

American Iron & Machine Works Co. has recently announced a number of promotions and transfers of key

E. H. ROYLE

A. G. PULLEN

HERMAN LAWSON

W. F. BEHRHORST

personnel in its organization. E. H. Royle, formerly representative for the company in North Texas with headquarters in Wichita Falls, has been promoted to district manager for south Louisiana and Mississippi to replace Austin Brashears who was recently killed in an auto accident. Royle will make his headquarters in New Iberia, La.

A. G. (Andy) Pullen, formerly rental yard manager at Oklahoma City for American Iron & Machine, has been transferred to Wichita Falls as sales representative to replace Royle in North Texas.

Herman Lawson has been transferred from the Oklahoma City main plant as sales representative for East Texas and North Louisiana with headquarters in Longview, Tex. This area was previously served from South Louisiana. W. F. Behrhorst has been transferred from California to West Texas to work out of Odessa district sales office. He had previously served as sales representative for the company in Kansas.

## Addition Doubles Capacity For Smith-Blair, Inc.

Smith-Blair, Inc., San Francisco, manufacturers of pipe-line supplies and specialties, has completed a factory addition that more than doubles plant capacity. According to Telford Smith, president, these new manufacturing facilities make it possible to absorb last year's increase in business and still maintain the company policy of prompt shipment on either standard or special orders.

## Kobe, Inc., Observes Its Anniversary Year

Kobe, Inc., manufacturer of hydraulic oil-well pumping equipment, is observing its twenty-fifth anniversary year. Started in a small shop in Los Angeles, the company has made many contributions to the improvement of oil-country equipment and operations, the most important being hydraulic free pumping, introduced late in 1947.

Free pumping makes possible the surfacing and seating of the bottom-hole pump by the turn of a valve, eliminating special pulling equipment, pulling crews, and the delays encountered by previous methods. The design for the pump, and the system of which it is a part, came off the drafting table of Kobe's president and general manager, C. J. Coberly.

The designing and building of a machine-driven cutting head, equipped with multiple jets, to slot pipe, put Kobe in business 25 years ago. This was followed in 1926 by the designing of a hydraulically operated oil-well pumping system. After 6 years of development work, the first hydraulical pumping unit was installed in a Standard Oil Co. well in Baldwin Hills field, California. From that time on the company placed its major emphasis on the development of hydraulic oil-well pumping.

C. J. COBERLY

## Demonstrator Displays Mason-Neilan Equipment

A new Mason-Neilan Regulator Co. demonstrator is on tour through the Southern states, from which it will proceed to the Southwestern and Pacific Coast states, returning east via the Rocky Mountain and Central

J. J. HOURIHAN, JR.

J. R. REDGRAVE

states, and terminating the tour in New England.

The demonstrator has been designed and built to provide an opportunity for instrument engineers and operating personnel to see a cross-section of Mason-Neilan control equipment, including latest developments. An air compressor is an integral part of the demonstrator, permitting much of the equipment to be in actual operation. Effectiveness of the demonstration is enhanced by use of cutaway models. This unusual field demonstrator is in charge of James J. Hourihan, Jr., assisted by John R. Redgrave, both factory-trained engineers.

## Ordnance Plant Bought by Union Asbestos & Rubber

Union Asbestos & Rubber Co. has announced that it has purchased a part of the former Bluebonnet ordnance plant at McGregor, Tex., from War Assets Administration. The acquisition consists of approximately 75,000 sq. ft. of manufacturing space and 125 acres of land and will be used principally to make high-temperature insulations. J. B. Crawford, formerly plant manager of the company's Cicero, Ill., plant, has been named manager.

Manufacturing operations will begin as soon as possible. When fully in production, the plant is expected to add substantially to the volume of asbestos products already being manufactured in the company's plants in Cicero and Earlville, Ill.; Paterson, N. J.; and Davidson and Marshville, N. C.

## Shartle Elected President Of Steel Founders Society

Elected president of the Steel Founders Society of America at the January meeting of the board of directors in Cleveland, Thomas H. Shartle, president of Texas Electric Steel Casting Co., Houston, presided at the February 9-10 annual national meeting of steel foundrymen in the Edgewater Beach Hotel, Chicago.

Shartle has been active for a number of years in the Steel Founders Society which represents producers of 98 per cent of the total tonnage of steel castings produced in the United States.

## Plastic Coating Elects Maffitt as President

Plastic Coating Corp., Houston, announces the election of T. S. Maffitt, Jr., president; W. Ratliff Walne, executive vice president and general manager; George E. Ross, vice president; Stewart D. Beckley, vice president; and Ernest S. Walne, secretary-treasurer.

## J. N. Metcalf Joins Curt Summers in South America

Curt Summers, who for many years has represented A-1 Bit & Tool Co., Mission Manufacturing Co., and Thornhill-Craver Co. in South America, has announced the appointment of J. N. "Red" Metcalf as an associate. Metcalf, after spending several weeks in the Houston plants of A-1, Mission, and Unibolt, left early in February to assume his duties in South America where he has served in a similar capacity for the past several years.

## Franklin to Rocky Mountain Area for New York Belting

C. A. Franklin, Jr., has been appointed district manager for New York Belting & Packing Co. in the Rocky Mountain area. He will have under his jurisdiction all of Montana, Nevada, eastern Idaho, Utah, Wyoming, Colorado, New Mexico, and Arizona.

Franklin graduated from Texas Christian University and after 7 years of experience in oil-field supply business, including Continental Supply Co., he joined New York Belting & Packing in July 1936. Until this latest appointment he was the company's representative in Texas, Arkansas, and Louisiana.

## Graham Made Pennsalt District Sales Manager

Donald W. Graham has been appointed district sales manager of the heavy-chemicals division of Pennsylvania Salt Manufacturing Co., to take charge of the Cincinnati sales office. Graham, who has been in charge of Pennsalt's St. Louis office for several years, succeeds C. W. Dermitt, who resigned early this month.

Temporarily, Graham will combine his duties at Cincinnati and St. Louis. He joined Pennsalt in 1932, became a salesman for the heavy-chemicals division, attached to the Chicago office in 1935, and went to St. Louis in 1943.

## Bowen Makes J. B. Wilcox Ass't. Manager of Stores

Bowen Fishing Tool Co. announces the appointment of James B. Wilcox as assistant manager of stores. First step in Bowen's expansion program has been to provide more men, more rolling stock, and a full line of tools for Rocky Mountain oil operators. James Wilcox is currently in charge of operations at Casper, Wyo. His new position will later take him throughout the west in supervising the activities of all Bowen stores. He has a good oil-field background and has been associated with the Bowen Fishing Tool Co. and S. R. Bowen Co. for a number of years.

## A-1 Bit & Tool Promotes McDonald and Robishaw

C. B. McDONALD

E. J. ROBISHAW

A-1 Bit & Tool Co., manufacturers of drilling and producing equipment, Houston, has promoted C. B. McDonald to executive vice president and director of sales. E. J. Robishaw, formerly in charge of research for the company, has been made sales manager.

Among other equipment manufactured by the company are rotary-type side-wall core barrels, wire-line core barrels, core bits, replaceable-blade drilling bits, mud mixers, combination casing mill and casing cutter, whipstocks, self-sharpening milling tools, rotary subs, and deviation instruments.

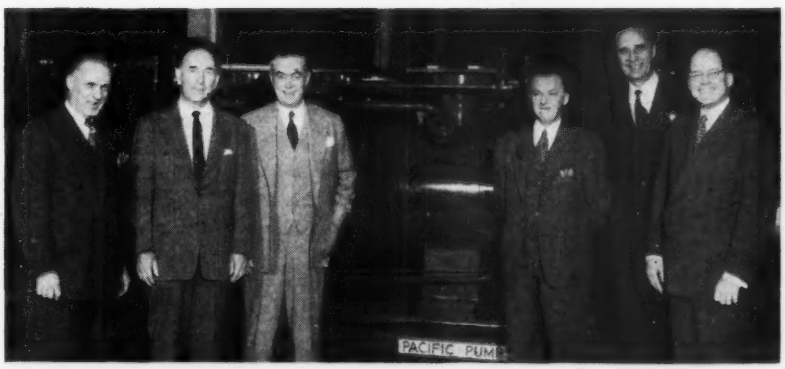
## Pittsburgh Transfers Bender to Mid-Continent

K. H. Bender, formerly tube sales engineer for Pittsburgh Steel Co., stationed at the general office in Pittsburgh, has been transferred to Tulsa to manage sales for the tubular specialties division of the company in the Mid-Continent district.

T. R. Miller, formerly Pittsburgh Steel's sales manager for the Tulsa area, has been made assistant sales manager of the Mid-Continent district. He will continue to office in Tulsa.

*(Continued on page 147)*

## Pacific Pumps Celebrate 25th Anniversary




***Pacific Pumps, Inc., affiliate of Dresser Industries, Inc., is celebrating its twenty-fifth year of specialized service to industry. Present for the occasion were: H. Neil Mallon, president; John B. O'Connor, executive vice president; William A. McAfee, president of Ajax Pipe Line Co.; Prescott S. Bush, all of Dresser Industries, Inc.; and Arthur R. Weis, president, and Elmer J. Weis, vice president of Pacific Pumps, Inc.***

# Classified Advertising

***The Market Place for the Oil Industry***

### UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

### DISPLAYED, PER INCH

$12.00 per column inch per insertion
One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

**THE OIL AND GAS JOURNAL**
**P. O. Box 1260, TULSA, OKLAHOMA**

### EQUIPMENT FOR SALE

FOR SALE: Used Bethlehem S-40 Unit complete, powered with 145-GKU Waukesha Engine. Actually used 314 hours. C. L. McMahon, Inc., Tulsa, Oklahoma.

1—SUPERIOR — Type FB — 6 x 7 Vertical Gas Engine Complete with Standard Equipment. Located in Houston. Will guarantee as good as new. Box C-783, The Oil and Gas Journal, Tulsa, Oklahoma.

APPROXIMATELY 43,000′ New 2⅜″ OD, Range 1, 4.7# Upset Tubing. Ft. Worth, Texas, ready for shipment. Subject to prior sale. Midwestern Constructors, Phone 3-4113, Tulsa, Oklahoma.

FOR SALE: One 8 HP Pattin Bros. gear power. Will pump eight shallow wells. Used little over year. May be seen at Charles Melton Lease; Chatham, Ohio. Baldwin Drilling Co., Berea, Ohio.

**FOR SALE**
**One Wilson Titan Rig, Complete.**
**PTAK PETROLEUM COMPANY**
**502 Hales Building**
**Oklahoma City, Oklahoma**

### EQUIPMENT FOR SALE

2500 FT. Sparta Spudder, tools from 12½ to 5¼ cordage; Rig in A-1 condition, International motor. Now in use in Neosho County, Kansas. Available two weeks. Box 312, Cherryvale, Kansas.

FOR SALE: Mayhew 2000 Drill mounted on 1948, 2 Ton Chevrolet with Thornton Tandem. Split shaft power take off. Auxiliary Chevrolet Motor. 36 foot mast. 24 foot kelly. Uses 20′ drill pipe. 4½ by 6″ Gardner-Denver Pump. This rig new in April, 1948, is complete in all details. In perfect condition, ready to work. Price $19,000.00. Ben-Franklin Exploration, Inc., 303 Orpheum Building, Wichita 2, Kansas.

WELL drilling spudders, beams, light rotaries, core drills, tools, casing. Used equipment at money saving prices. Spang and Mills new tools. Leschen lines. Everything for well drilling. Pressey & Son, Pueblo, Colo.

BULLDOZER: AC-HD7 Cable operated, angle and Bull blades. Top condition. Quick sale—$5,500.00. 19 Endicott St., Phillips, Texas; Phone 1388-W, Borger, Texas.

FOR SALE: 353 feet of 12¾″, 45# Byers genuine wrought iron pipe, new, range 1, Th & C. $7.00 ft. at Omaha. Omaha Drilling Corp., 624 Service Life Bldg., Omaha 2, Nebr.

TWO CARDWELL RL Spudders. Good operating condition. Fully equipped with 59′ mast, light plants, lines and tools. Located Central Oklahoma. Prices and terms. Write: Barnes Drilling Co., 22 West Fourth St., Tulsa, Oklahoma.

FOR SALE: Wilson Giant draw works, powered by 2—J.L.-1335 Buda engines and Wilson chain compound. Like new condition, with bargain price. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE: 2—12″ x 30″ Connersville Vertical Type Blowers, 1400 CFM, 1# WP, 275 RPM, requiring 8.6 HP. Cities Service Oil Co., Patridge, Bartlesville, Okla.

**FOR SALE**
12—230 H.P. Type 10 Bessemer New 17″ Power Cylinders complete ready to run with 16″ to 18″ Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.
**ENGLE PETROLEUM, Incorporated**
**Box 655, Evansville, Indiana**

### *COMPLETE* 5000-7000′ CAPACITY ROTARY RIG

## $45,000.00

EMSCO Draw works; two 12-cylinder Le Roi Engines, one *new,* one *factory overhauled;* new V-Belt Compound; 7¾″ x 18″ Pump; 300-ton B-J Hook; 26″ Gumbo Buster Rotary; Regan Crown Block; Emsco Swivel; Baash-Ross Traveling Block and Blowout Preventer; Butane Tank; Tool House and Tool Box; Vibrating Shale Shaker; 5 Kw. Kohler Light Plant; 6,200′ excellent 4½″ Drill Pipe with two Drill Collars. This rig is in splendid condition, and is *complete* and ready to drill. Located at Eunice, New Mexico.

**LUCEY PRODUCTS CORPORATION**
OIL WELL SUPPLIES
TULSA, OKLAHOMA

### EQUIPMENT FOR SALE

**FOR CABLE TOOLS**
**DEGEN PIPE AND SUPPLY CO.**
**Box 107, Red Fork Station, Tulsa, Oklahoma**

BOILERS For Sale: One 90 H.P., 125# W.P. Broderick—$750.00; one 100 H.P., 200# W.P. Lucey—$1,250.00. Both locomotive type oil field boilers. State certificates furnished. Recently overhauled. In good running shape. Worth the money. The Clay Brothers Drilling Company, Inc., 1804 Fair Building, Fort Worth, Texas.

2—M.C. 350 Bethlehem rotary drilling rigs complete with 127′ Lee C. Moore Cantilever (Jack-knife) derricks, less drill pipe and drill collars. For further information write Sharp Drilling Company, P.O. Box 1271, Midland, Texas.

**FOR SALE—CABLE TOOLS**
Cable tools from 4″ to 15″, all small connections, valves of all kinds, blowout preventers, drilling gates. One all steel drilling machine or cleaning out machine with Waukesha WAK motor, OCS clutch and 60′ A Mast. Approximately 80 Tons of cable tools.
**McComas Oilfield Supply, 606 S. Main, Phone 302, Box 173, Blackwell, Okla.**

**HOT OIL PUMPING UNITS**
Two Cooper-Bessemer gas engine driven hot oil pumping units, complete. One 612 GPM, 550 p.s.i.g. pressure differential pump with 400 HP engine. One 324 GPM, 800 p.s.i.g. pressure differential with 240 HP engine. In excellent condition. Would consider selling either GNG-8 or ENG-8 separately. Inquire
**E. B. McCormick, Chief Engineer**
**COSDEN PETROLEUM CORPORATION**
**Box 1311 Big Spring, Texas**

## SEAMLESS CASING

**Just Pulled—Like New**

Approx. 3,780 ft. 8⅝″ OD, 36.7-lb., with 10½″ collars ..... **$3.50 ft.**

Approx. 1,400 ft. 10¾″ OD, 45.7-lb., with 12″ collars ..... **$5.00 ft.**

Located western Kansas

**BROWN-STRAUSS CORP.**
**Kansas City 10, Missouri**
**P.O. Box 78 L.D. 169**

### USED STEEL PIPE AND TUBING

100,000 ft. of 1½″ O.D., 8 gauge
75,000 ft. of 2″ O.D., 10 gauge to 11 gauge
100,000 ft. of 2¼″ O.D., 10 to 11 gauge
50,000 ft. of 3½″ O.D., 9 gauge
40,000 ft. of 4″ O.D., 10 to 11 gauge
50,000 ft. of 5½″ O.D., 8 gauge
All the above is seamless, plain end, hydrostatically tested for 850 lbs. pressure.
16,000 ft. of 3″ standard line pipe, 8 thread
25,000 ft. of 6″ I.D. welded steel pipe, approx. ⅛″ wall, plain end
6,000 ft. of 7″ O.D. lapweld casing, 8 thread, 20 lbs.
3,400 ft. of 14″ O.D. Naylor spiral welded steel pipe, 14 gauge, 40′ lengths, grooved for Victaulic couplings

**Reasonable prices. Immediate shipment**

Also, bolted, welded and riveted steel tanks for storage and pressure.
600 tons of steel plates from ¼″ to ⅝″ coming from grain tanks, like new, free of holes.

Please send for our late lists.

**A. GREENSPON PIPE CO., INC.**
**3615 Olive Street St. Louis (8), Mo.**
**Phones Nos. Franklin 0064 and 1606**

## EQUIPMENT FOR SALE

22-W Bucyrus-Erie Spudder, semi-trailer mounted, spooling device, casing reel, rubber cushioned sheaves, two years old, no tools. Excellent condition. Price $3,750 cash, F.O.B. location. Located Midwest. Box C-811, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1—Model QSVSI Cardwell Allsteel Single Drum Oil Well Servicing Skid Type Winch, Serial No. QS-119, powered by Ford V-8 Engine Serial No. BB18-183910 located at Duncan, Oklahoma. Price $900. Cities Service Oil Co., Patridge, Barnesville, Okla.

FOR SALE: 10,000 ft. 20" OD x ¼" Wall New Electric Weld Steel Pipe, Double Random Lengths; 50,000 ft. 18" OD x 5/16" Wall Used Steel Pipe, Single Random Lengths. Utility & Industrial Supply Company, 921 Michigan Ave., E., Jackson, Michigan.

PIPELINE Construction Equipment for Sale: Pipe cleaning machine with priming head, traveling or stationary, 6" to 12", excellent condition, $1,350. Two T40 International tractors with pipelayer attachments. Good condition, very cheap. Contact C. W Sternberg, 8250 Wier Drive, Houston, Texas Phone Preston 7043.

FOR SALE: 100 H.P. LeRoi Motor cheap, also 35 Bessemer and 40 Weber. Light steel ladders, 12 foot. 409 Bewley Bg. 2-1620, Fort Worth.

FOR SALE: Approx. 600' of 7" 22# used Seamless Casing, 1500' of 2½" 10thd Seamless used Tubing. Tennant Drilling Co., 210-211 Rivoli Theatre Bldg., Blackwell, Okla.

FOR SALE: 5CR6 Ideco Draw Works with 2 WAK Waukesha Motors compounded with V-Belt Compound; Model RL Cardwell Draw Works with 2 GAK Waukesha Motors; and 1—R6I Climax Motor. All in good condition. Sterling Drilling Company, Sterling, Kansas.

### FOR SALE

3713 feet 9⅝ O.D. 40.6# Seamless Oil Well Casing. Run in well but in excellent condition. Priced to sell.

1—125 H.P. 350# Working Pressure "Oil Well Boiler," completely reconditioned and in excellent condition. State inspected. $2250.00 our yard, Okla. City.

**POWELL BRISCOE, INC.**
**1916 First National Bldg.**
**Oklahoma City, Okla.**

### NEW A.P.I. STEEL BOLTED TYPE TANKS

| | |
|---|---|
| 4— 250 bbl. | 4— 1,500 bbl. |
| 4— 500 bbl. | 4— 2,000 bbl. |
| 4— 750 bbl. | 1— 5,000 bbl. |
| 4—1,000 bbl. | 6—10,000 bbl. |

2—500 bbl. aluminum, 8 gauge

All for immediate shipment

**A. GREENSPON PIPE CO., INC.**
**3615 Olive Street St. Louis 8, Missouri**

80,000' 6⅝" 19.45# T&C Line Pipe. No. 1, Used. Located: Longview, Texas.

6,600' 5½" 15.5# J-55 Seamless. New. Located: Ellinwood, Kansas.

1—55,000 bbl. and 1—80,000 bbl. all-welded steel storage, for lease or sale. Located: Danciger Refinery, Longview, Texas.

**W. C. BERRY**
**Tulsa, Oklahoma**
**Box 1858 Phone: 3-6141**
**Dallas, Texas**
**1309 Mercantile Bank Bldg.**
**Phone: Central 2950**

## EQUIPMENT FOR SALE

**CABLE TOOLS DRILLING RIG COMPLETE**
**66 WICHITA SPUDDER, 200 HP LeROI**
**Phone 423-J, Artesia, New Mexico, Box 125**

6300 FT. of New 6⅝ line pipe; 1000 ft. of 8¼ pipe, used; 4000 ft. of boiler flues, used. A. R. Daniel, Garnett, Kansas.

FOR SALE: Franks Model D shot hole drill. Mounted on 1942 Ford. Rig and truck in A-1 condition. Must see to appreciate. $3,500 cash. Seismograph Drilling Supply, Britton, Oklahoma.

ONE O.C.S. Greyhound sandreel. One Model FC O.C.S. Reverse clutch. Box 861, Oklahoma City, Oklahoma. Phone 5-6407.

FOR SALE: Two Franks Model FA Shot Hole Drills. One mounted on 1947 2 Ton Chevrolet, one on 1947 2 Ton Ford. One Water tank 700 gallons capacity, mounted on 1947 2 Ton Chevrolet, one 575 gallons capacity, mounted on 1947 1½ Ton Ford. Complete with all necessary equipment. Each Drilling unit with water tank truck $8750.00 or all equipment $17.000.00. Now in use. Telephone 62-4267, Oklahoma City, or write Box C-812, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Model "K" Cardwell, single drum draw works powered by G.A.K. Waukesha engine. Equipped with 98' "A" mast and sub skid. Priced for quick sale. Terms. Melton Supply Co., Seminole, Okla.

### FOR SALE

### DIESELS AND PUMPS

3—New unused 475 BHP 5 cylinder Baldwin Model VG Diesel Engines, one connected to Ingersoll-Rand Multi-stage Centrifugal Pump with Farrell-Birmingham Step-up Gear and two connected to Worthington Horizontal Triplex Double Acting Pumps, all units complete with Falk couplings, Lummus Coolers, other accessories. Location Ohio, immediate shipment. Direct inquiries to

**THE BUCKEYE PIPE LINE COMPANY**
**Joseph Steele, Purchasing Agent,**
**Room 2200, 30 Broad St., New York 4, N. Y.**

## EQUIPMENT FOR SALE

FOR SALE: J-55—5½"—17# Casing, drive pipe from mill, 10,000 ton contract; end-users only. Box C-791, The Oil and Gas Journal. Tulsa, Okla

FOR SALE—Cardwell Draw Works, Model "L"—Air Clutches—A-1 Condition. Box 3348, Corpus Christi, Texas.

1—7¼ x 14 OILWELL Power Pump for rotary tools steam or power. Chapman Pipe & Supply, Oklahoma City, Okla.

### REFINERY

**For Sale Complete Treating and Super-Fractionating Plant. Located on Gulf Coast for economical handling of raw and refined products by rail, water or motor transport. Equipment in good condition. Box C-815, The Oil and Gas Journal, Tulsa, Oklahoma.**

### MANUFACTURERS LATEST DESIGN

Hydraulic Casing Pulling Units. Complete line of equipment. Units made to your specifications. Truck Mountings or Skid Units. Repair Service and Parts.

**OKLAHOMA MACHINE & SUPPLY CO.**
**Ada, Oklahoma**

### STEEL STORAGE TANKS

**12-55,000 Bbl.**
**2-18,000 Bbl.**
**1-17,500 Bbl.**
**1-15,000 Bbl.**
**7- 5,000 Bbl.**

**All above tanks available for prompt delivery. Detailed specifications, locations and prices available upon request.**

**HORWITZ PIPE & STEEL CO.**
**P. O. Box 2534, Tulsa, Okla.**
**Phone 2-9128**

## FOR SALE

# COMPLETE GAS GENERATING PLANTS

*Formerly Owned By*

# SO. CALIF. GAS CO.

**AVAILABLE IMMEDIATELY—ENTIRE UNITS OR PARTS**

- **PUMPS**
- **BLOWERS**
- **COMPRESSORS**
- **OIL STORAGE TANKS**
- **GENERATORS**
- **EXHAUSTERS**
- **BOILERS**
- **GAS HOLDERS**

## WESTERN STEEL CUTTING, INC.

**P.O. Box 31, Bell, Calif. Phone: Los Angeles—LOgan 8-2188**

## FOR SALE

**We specialize in spot shipments of oil well casing. Listed below are a few of our current offerings:**

**NEW SEAMLESS OIL WELL CASING**

| | Price per ft. | F.O.B. |
|---|---|---|
| 15,000' J-55 5½" OD 15½#, 8 RT, Long Coup., Range 2 | $2.00 | Pitts. Area |
| 20,000' J-55 5½" OD 17#, 8 RT, Long Coup., Range 2 | 2.35 | Dallas Area |
| 6,800' J-55 7" OD 17#, 8 RT, Long Coup., Range 2 | 1.85 | Pitts. Area |
| 3,000' J-55 7" OD 20#, 8 RT, Long Coup., Range 2 | 2.40 | Pitts. Area |
| 20,000' J-55 7" OD 23#, 8 RT, Long Coup., Range 2 | 2.75 | Dallas Area |
| 3,000' J-55 8⅝" OD 24#, 8 RT, Long Coup., Range 1 | 2.85 | Pitts. Area |
| 3,000' J-55 10¾" OD 32¾#, 8 RT, Long Coup., Range 1&2 | 4.25 | Dallas Area |

**NEW TUBING**

| | | |
|---|---|---|
| 150,000' J-55 2⅜" OD Ext. Upset Tubing, 8 RT, Range 2 | .85 | Dallas Area |
| 10,000' J-55 2⅜" OD Ext. Upset Tubing, 8 RT, Range 2 | 1.00 | Los Angeles Area |

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## EQUIPMENT FOR SALE

PIPE: 4000′ 5½″ OD, 14#, 8 rd. thrd., Range 3 seamless casing; 4000′ 5½″ OD, 14#, 8 rd. thrd., Range 2 seamless casing; 4750′ 2″ EUE, 4.7#, 8 rd. thrd., Range 2 seamless tubing; Two 210 bbl. welded tanks; One Bethlehem, 25-T B-5 pumping unit with FM ZC118. The above material purchased new less than 60 days ago and is now in same as new condition.

25,000′, 2″ EUE, 4.7#, 8 rd. thrd., Range 2 Seamless tubing; 5000′, 5½″ OD, 14#, 8 rd. thrd., Range 2 new seamless casing. All the above subject to prior sale. Geo. R. Brown, Jr., 911 Neil P. Anderson Bldg., Fort Worth, Texas. Phone 2-7088.

BUCYRUS-ERIE 24L Spudder, Trailer mounted; over 5,000 feet line; 2 strings of tools 4 inch to 10 inch; 2½ ton G.M.C. Tandem Dual Truck with detachable A-Frame and winch; 8-ft. x 10 ft. metal tool shed; Kohler Light Plant; 470 ft. new 10 inch wrought iron pipe; some used 6 and 8 inch pipe. All $10,000.00 Lealand West, The Scott County State Bank Building, Scottsburg, Indiana, Telephone 4931 or 4391

SAVE WITH SAFETY—Very Good Used Wire Line—Any Size or Length up to 5,000′—Respooled for Your Inspection — Cable Tools For Sale. General Tool & Supply Co., P.O. Box 4387, Phone 61335, Oklahoma City, Okla.

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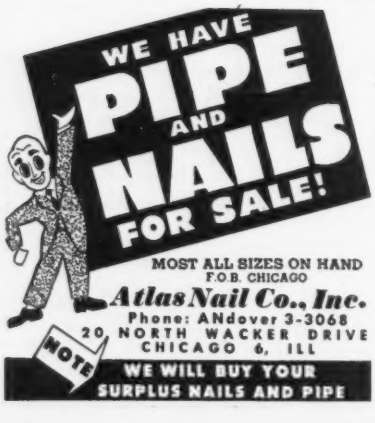


## EQUIPMENT WANTED

WANTED: 3½″ OD or 4½″ OD used drill pipe. 3½″ OD line pipe or tubing. SCHAFER PLOW, INC. Box 578, Pratt, Kansas. Attn.: J. L. Crowder.

**EQUIPMENT WANTED**

Am interested in purchasing good-second-hand, unit 15 rig, with either 2 or 3 motor compound. Please send description, price, and location to: Box C-732, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Portable 4500′ Rotary Rig complete with drill pipe. Prefer truck mounted. Send inventory photos and complete details. Krug Drilling, Burlingame, California, 717 Linden Avenue.

WANTED: Three or four thousand feet of 2⅜″, range one (approximately 20′ lengths) drill stem with or without tool joints. Clemens Exploration, Box 136, Princeton, Indiana.

## HELP WANTED

WANTED: Supervisor for refinery pump and engine maintenance. Applicant must have engineering training and experience. Good salary with house furnished at low rent. Box C-746, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Geologist with at least six years' experience in Texas Gulf Coast Area. Box C-758, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED and rounded Land Man for large company, preferably with Texas experience. Age limit 45 years. Inquiries will be treated confidentially. Box C-801, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED by aggressive independent operator: Young Geologist with well experience in North Central Texas. Salary open. Box C-796, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men: Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

### CHIEF ENGINEER AND WORKS MANAGER

Old established oilfield equipment manufacturer, principal products Well Heads, Christmas Trees and Tool Joints, desires graduate petroleum engineer to direct engineering and manufacturing departments. Good opportunity for engineer to gain experience in production work. Actual field and design experience necessary qualification.

Box C-813, The Oil and Gas Journal, Tulsa, Oklahoma

### ENGINEERING

During the next several months we will increase our Engineering Organization engaged in the design of Oil Refinery Plants and Power Plants. Location Cleveland, Ohio. The men we need should be qualified as draftsmen, designers, checkers or in higher engineering skills on design of piping, instrumentation, pressure vessels, structural steel, concrete, mechanical or electrical. For presenting your qualifications and prompt consideration, write to us for application form.

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## HELP WANTED

GRAVITY PARTY CHIEFS: We have several attractive openings in domestic work for experienced and well qualified Party Chiefs. Best opportunities in the industry. Box C-804, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Drillers & Drillers' Helpers for work on truck mounted rotary for drilling of holes to catch formation samples. Do not apply unless familiar with rotary equipment and willing to take orders. Drillers must have experience in running rock bits and drag bits. Will consider seismograph drillers and helpers with 3 or more years experience. When applying give references, last employer and reason for leaving. Write Box C-817, The Oil and Gas Journal, Tulsa, Oklahoma, for particulars concerning hours, wages, etc.

## SITUATIONS WANTED

PRODUCTION Superintendent with 26 years' experience desires oil production job, domestic or foreign. References. Box C-794, The Oil and Gas Journal, Tulsa, Oklahoma.

COMPRESSOR Station Superintendent seven years. Age 38. Experienced plant construction. Reference and record on request. Available immediately. Clint Clark, Box 71, Scott City, Kansas.

PETROLEUM Engineer desires position in Mid-Continent area. Three years' experience in well completions, work-over operations, production problems, and reservoir engineering. Can take over duties of production superintendent. Available April 1, 1949. Box C-814, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Experienced in subsurface and well Geology, also some experience in petroleum engineering, desires position in Rocky Mountain area. Single, age 30, available in May 1949. Box C-781, The Oil and Gas Journal, Tulsa, Oklahoma.

CAPABLE Oil Executive to manage and operate leasing, drilling, and producing oil properties. Thoroughly reliable, twenty years' experience. Available March 1, 1949. Box C-770, The Oil and Gas Journal, Tulsa, Oklahoma.

SECRETARY with initiative and executive ability, extensive oil experience and with legal training desires permanent connection with independent oil company in Mid-Continent area. Write Box C-780, The Oil and Gas Journal, Tulsa, Oklahoma.

OILFIELD supply executive with wide acquaintance in the Gulf Coast area desires change. Twenty years' experience in every phase of the petroleum supply business. Would consider responsible, executive position with some good supply company or oil company, needing man with these qualifications. Can furnish best of references. Box C-807, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER, 7 years experience in drilling, completions, and production. Have some experience in geology and administrative work. Young, single, willing to work anywhere. Box C-802, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL Engineer, Ph.D., experienced design refineries, rating and sizing equipment, procurement; coordinating layout, drafting; inspecting, installing equipment, seeks responsible position with refining or engineering firm. Box C-816, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES Representative: 20 years experience oilfield equipment, covering selling, direct and through distributors, also sales promotion and management. Specialty items preferred. Box C-818, The Oil and Gas Journal, Tulsa, Oklahoma.

## LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

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## INVESTMENTS

CIVIL ENGINEER, with National reputation, desires some cash, balance credit, for nation-wide, 100%-civic, financially-sound, money-making, can't-lose, C. of C.-sponsored, recreational projects. Principal or Agent, for details, write, call or wire Wesley Bintz, Lansing, Michigan.

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**1949 EXECUTIVES MAP OF PERMIAN BASIN**

showing sections, surveys, towns, oilwells, drilling wells, dry holes, field names, depths, producing horizons, discovery dates, larger lease blocks, in three colors. Size 3 x 4 ft.

**Price $10.00**

**Descriptive illustrated folder on request.**

**SOUTHWEST MAPPING COMPANY**
**1101 Ft. Worth Nat'l Bldg.**
**Fort Worth 2, Texas**

## LEASE AND DRILLING BLOCKS

WANTED to Purchase by Independent Oil Company—Oil Production in Kentucky, Indiana and Illinois. Will consider leases producing 25 to 250 barrels daily. Box C-757, The Oil and Gas Journal, Tulsa, Oklahoma.

### OIL AND GAS OPERATORS

Gas from 16 producing areas in Sacramento Valley, California, has a 1949 average contract price at the well of 19c per M.c.f. Producing depth ranges 3,000 to 4,000 feet. Drilling blocks available in favorable areas. Box C-810, The Oil and Gas Journal, Tulsa, Okla.

LARGE undrilled tract near Yates Pool, Crockett Co., Texas, for lease. Must have specific performance clause and override. For legal description and other details contact E. V. Brown, 4001 E. Washington St., Indianapolis, Indiana

FOR SALE: Wild Cat Leases, Drilling Blocks, and Royalties in Kentucky and Tennessee. Write: Harvey Daugherty, White Run, Kentucky.

OIL LEASES for sale in large, small or medium size blocks in Colorado, Wyoming, New Mexico, Montana, Arizona. Wholesale or retail. Write for descriptive list. Dyer-OJ 1835 Champa, Denver, Colorado.

LARGE LEASE BLOCKS, drilling proposition in Arizona's San Juan Basin. Famous "buried structure" area. Surrounded by exploration. C. C. Smith, 214 E. 9th, Casa Grande, Arizona. Phone 293.

INVESTORS over 300 Strikes 1948 in Texas. The Proof of Profits is here buying cheap acreage ahead of drilling. E. M. Adams, Marshall, Texas.

SETTLED production, S. E. Kansas, potential 30 barrels, 14 oil wells, Arbuckle, 840 ft., 6 gas wells, premium crude, 70% natural lube base, several undrilled locations, drilling cost $1.50 per foot, never acidized or shot, gas or water injection unnecessary. Positively ill health reason for selling. For full particulars write: Box 254, Chetopa, Kansas.

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**Inquiries Invited**
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**60 Broadview Drive, Clayton (5), St. Louis, Missouri**

## SERVICES

RADAR Surveys: Latest mobile radar equipment installed in Jeep and modified for oil exploration. Locates and outlines areas of possible oil saturation. Defines faults. For further information write Geotronic Laboratories, 421 S. Locust St., Centralia, Illinois.

LIST large oil companies operating in South America and Middle East, showing where to apply for jobs overseas. Price $2.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

## FOR SALE—MAPS

**COUNTY MAPS**
**For Oil & Gas Industry, Public Offices, and Travelers**

CALIF.: with Twnshp., Rng., Sec., Mines, Roads, Trails, Streams, Lakes, R.R., Schools, Rngr. Sta., Elev., Ntl. Forest, Pwr. Lines, Canals, Boundaries, Oil Districts, etc.

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Fresno, Kern, Riverside—$2.50 - $5.

Los Angeles—$1 and $3.

Siskiyou—$2 and $4.

Inyo County, $15; E or W½, $7.50; San Bernardino, 73x110, $15; No. or So. ½, $7.50; NW., SW., NE., or SE. ¼, $3.75.

**Also Oregon, Idaho and Washington County Maps**

**WORLD'S MINERALS**
**2417 San Pablo Avenue, OAKLAND 12, California. TEmplebar 2-3870**

# Equipment Men

*(Continued from page 143)*

## Eagle-Picher Names Lynde To Insulation Division

An announcement has been made by Eagle-Picher Co. of the appointment of Clyde B. Lynde as vice president and general manager of the insulation division of Eagle-Picher Sales Co. He joined Eagle-Picher in 1933 as Joplin insulation district manager and head of the insulation contracting department of that company.

Lynde has had many years' experience in virtually all phases of the insulation business, including both home and industrial installations. He was active during the war in the construction of several of the largest high-octane - gasoline refineries, synthetic - rubber plants, and chemical-process plants in the Southwest.

## Theobald Replaces Boehm as Mathieson Sales Manager

Mathieson Chemical Corp. announces three recent changes in personnel. Roland F. Boehm, who was district sales manager of the Houston office, has been transferred to the ammonia department, with headquarters in the company's New York offices.

O. J. Theobald, Jr., formerly district sales manager of Mathieson's Charlotte, N. C., office, replaces Boehm as district sales manager at Houston. J. F. Carey, formerly a sales representative in the Charlotte territory, has been named district sales manager.

## Austin Joins Aeroquip As Sales Engineer

L. A. Pyeatt, vice president and general sales manager of Aeroquip Sales & Engineering, Inc., announced recently the appointment of Tom Austin as sales engineer. Austin represents Aeroquip in Missouri, Kansas, Nebraska, and Colorado, and has his headquarters in Kansas City, Mo. He attended Southern Methodist University in Dallas, and was in the Navy for 2 years. Before coming with Aeroquip, he was associated with Power Transmission Co. of Dallas.

## Hacke Transferred to Tulsa

Clyde A. Hacke, formerly branch manager at Great Bend, Kans., for Parkersburg Rig & Reel Co., has been transferred to Tulsa to become chief clerk in the division office.

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**March**

American Institute of Chemical Engineers, regional meeting, Biltmore Hotel, Los Angeles, March 6-9.

American Petroleum Institute, Southwestern district, Galvez Hotel, Galveston, Tex., March 9-11.

American Association of Petroleum Geologists, regional meeting; Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, Jefferson Hotel, St. Louis, Mo., March 14-17.

American Petroleum Institute, division of production, Mid-Continent district meeting, Mayo Hotel, Tulsa, March 23-25.

New England Gas Association, Hotel Statler, Boston, March 24-25.

Illinois Oil and Gas Association, annual meeting, Hotel Emmerson, Mount Vernon, Ill., March 25.

North Texas Oil and Gas Association, annual meeting and secondary-recovery forum, Hotel Kemp, Wichita Falls, Tex., March 25-26.

Western Petroleum Refiners Association, thirty-seventh annual meeting, Plaza Hotel, San Antonio, Tex., March 28-30.

American Chemical Society, division of petroleum chemistry, spring meeting, San Francisco, March 27-April 1.

**April**

Texas Independent Producers and Royalty Owners Association, Houston, April 1.

American Petroleum Institute, division of refining, mid-year meeting, Shamrock Hotel, Houston, April 4-7.

American Society of Lubrication Engineers, annual meeting, Pennsylvania Hotel, New York, April 11-13.

National Association of Corrosion Engineers, annual convention, Netherlands Plaza Hotel, Cincinnati, Ohio, April 11-14.

Southwestern Gas Measurement Short Course, University of Oklahoma, College of Engineering, Norman, Okla., April 12-14.

National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 13-15.

Natural Gasoline Association of America, annual meeting, Texas Hotel, Fort Worth, April 20-22.

Southern Gas Association, annual convention, Buena Vista Hotel, Biloxi, Miss., April 20-22

Petroleum Industry Electrical Association, Petroleum Electrical Supply Association, annual convention, Mayo Hotel, Tulsa, April 26-28.

American Petroleum Institute, eastern district, William Penn Hotel, Pittsburgh, Pa., April 27-29.

**May**

Independent Petroleum Association of America, midyear meeting, Roosevelt Hotel, New Orleans, La., May 3-4.

American Petroleum Institute, division of marketing, midyear meeting, Jefferson Hotel, St. Louis, May 9-10.

American Gas Association, natural-gas department, spring meeting, French Lick Springs Hotel, French Lick, Ind., May 9-10.

Interstate Oil Compact Commission, spring quarterly meeting, Roosevelt Hotel, Jacksonville, Fla., May 9-11.

American Institute of Chemical Engineers, regional meeting, Mayo Hotel, Tulsa, May 9-11.

American Petroleum Institute, division of production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, Calif., May 12-13.

Instrument Society of America, annual spring meeting, Royal York Hotel, Toronto, Canada, May 12-13.

Oil-Heat Institute of America, national oil-heat exposition and annual convention, Boston, Mass., May 16-20.

American Petroleum Institute, Rocky Mountain district, Gladstone Hotel, Casper, Wyo., May 26-27.

Natural Gas and Petroleum Association of Canada, annual meeting, Hotel London, London, Ont., Canada, May 26-27.

Fourth Annual Short Course in Gas Technology, sponsored by Southern Gas Association, Texas A. & M. College, Kingsville, May 30-June 1.

**June**

Petroleum Equipment Supplier's Association, annual meeting Broadmoor Hotel, Colorado Springs, Colo., June 5-7.

American Society for Testing Materials, fifty-second annual meeting, Hotel Chalfonte Haddon Hall, Atlantic City, N. J., June 17-July 1.

Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh, Pa., June 16-17.

**September**

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 14-16.

**October**

National Lubrication Grease Institute, Hotel Roosevelt, New Orleans, La., October 3-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Rice Hotel, Houston, October 13-14.

American Gas Association, annual convention, Chicago, Ill., October 17-20.

**November**

American Petroleum Institute, annual meeting, Chicago, Ill., November 7-10.

**December**

American Institute of Chemical Engineers, annual meeting, William Penn Hotel, December 4-7.

**NOMADS**

**Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.**

**Los Angeles Nomads, second Wednesday each month, Jonathan Club.**

**New York Nomads, March 7, at Louie Sherry's.**

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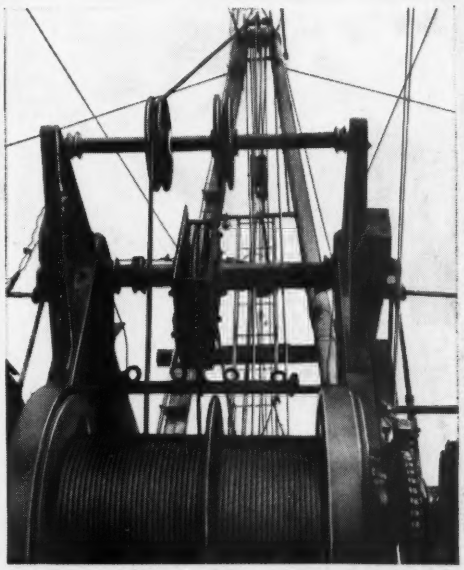

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